



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**EXPLORING MARINE CORPS OFFICER QUALITY:
AN ANALYSIS OF PROMOTION TO LIEUTENANT
COLONEL**

by

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March 2017

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REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 2017		3. REPORT TYPE AND DATES COVERED Master's thesis
4. TITLE AND SUBTITLE EXPLORING MARINE CORPS OFFICER QUALITY: AN ANALYSIS OF PROMOTION TO LIEUTENANT COLONEL			5. FUNDING NUMBERS	
6. AUTHOR(S) Matthew R. Stolzenberg				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB number NPS.2076.0089-IR-EP5- A.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.			12b. DISTRIBUTION CODE	
13. ABSTRACT (maximum 200 words) The United States Marine Corps (USMC) is an elite organization, considered one of the most formidable military branches in the world. Through its talent management policies the Marine Corps seeks to retain and promote the highest quality personnel. This study explores the question of identifying and measuring factors associated with Marine officer quality. This thesis analyzes five years of USMC lieutenant colonel (LtCol) promotion board data to identify career factors that predict promotion to LtCol. Multivariate regression models are used in this thesis to assess the effects of FITREP scores, specific FITREP attribute scores, and career performance factors on the probability of promotion to LtCol. The results suggest that both subjective scores on officer FITREPs as well as objective measures of performance, such as awards and career accomplishments, are important in predicting promotion and tend to be complementary in capturing Marine quality. The findings also show that different factors predict LtCol selection across military occupational specialties (MOS), indicating a potential influence of MOS-specific subcultures on evaluations. Based on these findings, the study presents policy recommendations as well as suggestions for future research on quality of Marine Corps personnel.				
14. SUBJECT TERMS USMC, Marine Corps, talent management, officer quality, quality, significant factors, predicting promotion, promotion, promotion probability, officer			15. NUMBER OF PAGES 133	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU	

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**EXPLORING MARINE CORPS OFFICER QUALITY:
AN ANALYSIS OF PROMOTION TO LIEUTENANT COLONEL**

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MASTER OF SCIENCE IN MANAGEMENT

from the

**NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

The United States Marine Corps (USMC) is an elite organization, considered one of the most formidable military branches in the world. Through its talent management policies the Marine Corps seeks to retain and promote the highest quality personnel. This study explores the question of identifying and measuring factors associated with Marine officer quality. This thesis analyzes five years of USMC lieutenant colonel (LtCol) promotion board data to identify career factors that predict promotion to LtCol. Multivariate regression models are used in this thesis to assess the effects of FITREP scores, specific FITREP attribute scores, and career performance factors on the probability of promotion to LtCol. The results suggest that both subjective scores on officer FITREPs as well as objective measures of performance, such as awards and career accomplishments, are important in predicting promotion and tend to be complementary in capturing Marine quality. The findings also show that different factors predict LtCol selection across military occupational specialties (MOS), indicating a potential influence of MOS-specific subcultures on evaluations. Based on these findings, the study presents policy recommendations as well as suggestions for future research on quality of Marine Corps personnel.

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LIST OF ACRONYMS AND ABBREVIATIONS

ALMAR	All Marine Corps Message
CD	Career Designation
CCLEB	Commandant's Career Level Education Board
CFT	Combat Fitness Test
CMC	Commandant of the Marine Corps
CNA	Center of Naval Analysis
CPIB	Commandant's Professional Intermediate Board
CSC	Command and Staff College
DOPMA	Defense Officer Personnel Management Act
EWS	Expeditionary Warfare School
FITREP	Fitness Report
FMF	Fleet Marine Force
FRS	Fleet Replacement Squadron
FY	Fiscal Year
GCT	General Classification Test
LCN	Lineal Control Number
LtCol	Lieutenant Colonel
MARADMIN	Marine Corps Administrative Message
MCBUL	Marine Corps Bulletin
MCO	Marine Corps Order
MECEP	Marine Corps Enlisted Commissioning Education Program
MEU	Marine Expeditionary Unit
MMOA	Marine Manpower Officer Assignments
MOS	Military Occupational Specialty
MRO	Marine Reported On
PES	Performance Evaluation System
PFT	Physical Fitness Test
PME	Professional Military Education
PMOS	Primary Military Occupational Specialty
OCS	Officer Candidates School

Occfield	Military Occupational Specialty Field
OMPF	Official Military Personnel File
RO	Reporting Officer
RS	Reviewing Senior
SecDef	Secretary of Defense
SecNav	Secretary of the Navy
SP-MAGTF	Special Purpose Marine Air Ground Task Force
SEP	Special Education Program
TBS	The Basic School
TIG	Time in Grade
U.S.C.	United States Code
USMC	United States Marine Corps
USN	United States Navy
YCS	Years of Commissioned Service

ACKNOWLEDGMENTS

I would like to thank my wife, Kristi, for putting up with my odd working hours and endless complaints about not knowing what I was doing. She helped me maintain a positive attitude throughout the program while holding her own job, pursuing her own master's degree, and tirelessly supporting our family's daily lives. I thank my kids, Jack and Reagan, for cheering me up every day that I came home in a bad mood and keeping the important stuff in perspective. My advisors, Professors Tick and Mehay, deserve a lot of credit for sharing their expertise on the process of writing of a thesis. Last, I would like to thank my fellow cohort members, Greg, Clif, Dick, Charlyne, and Tammy. They facilitated my learning experience by adding to my knowledge base with every conversation.

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I. INTRODUCTION

This study undertakes a quantitative analysis of career and demographic factors that may identify various dimensions of the quality of Marine Corps officers. The thesis treats attaining the rank of lieutenant colonel (LtCol) as a standard of a successful career officer. Data on officer careers will be analyzed using multivariate regression models to identify factors that are predictors of quality among LtCols. Specifically, this thesis estimates models of promotion to LtCol among promotion-eligible Majors. Determining what traits the Marine Corps values in officers who attain the rank of LtCol will contribute to the understanding of officer quality and development of future force-shaping tools and talent-management policies.

A. BACKGROUND

Since its inception, the Marine Corps has prided itself as an organization of the few and the proud. Unofficially, Marines are the standard by which all other services measure themselves. In a fast-changing environment, the Marine Corps needs to define what specific traits characterize a high-quality Marine officer so that policies can be adopted to better recruit, train, and retain top-quality personnel. The Deputy Commandant of Manpower and Reserve Affairs' 2016 Strategic Guidance identifies the need to ascertain traits that are associated with quality (Headquarters Marine Corps [HQMC], 2016). The term "quality" has a different meaning to different groups or organizations. The military, specifically the Marines, values individual traits that enable the warfighter to be an effective thinking professional in all aspects of their service. Those traits may not be easily quantified with readily available personnel data. This thesis provides an exploratory study on how the Marine Corps defines quality among its officers, specifically among its senior leaders, and identifies how those traits are currently captured with available personnel data.

B. PURPOSE

The benefit of this study is to provide information to guide future force shaping and personnel policies. The goal is to create a baseline of what the Marine Corps

considers officer quality characteristics. Additionally, based on the findings drawn from the data analysis, the thesis formulates recommendations for future policies. Understanding what the Marine Corps' desires in its officers may lead to new force shaping and talent management policies.

C. RESEARCH QUESTIONS

1. Primary Question

- What factors do the Marine Corps use to measure and predict officer quality?

2. Secondary Questions

- Do the factors used to measure and predict Marine officer quality vary across MOS?
- Are subjective and objective measures complementary in assessing officer quality?

D. SCOPE AND LIMITATIONS

The scope of this thesis includes analysis of the characteristics of Marine Majors who are eligible for selection to LtCol. The study identifies background attributes (e.g., cognitive test scores, The Basic School standing, etc.), demographic characteristics (e.g., gender, race, etc.), and subjective and objective professional job performance measures (e.g., scores from Marine Corps' Fitness Reports [FITREPs]) that are consistently highly correlated with career advancement among recent LtCol promotion cohorts. A secondary analysis attempts to identify the relative contribution of each factor in explaining career advancement. The sources of the data include the Total Force Data Warehouse (TFDW), Manpower Management Records and Performance-30 (MMRP-30), and The Basic School (TBS). The analysis identifies the background, demographic and job performance factors that statistically predict officer promotion, and uses the statistical results to infer which factors are most highly valued by the Marine Corps.

E. ORGANIZATION OF THE STUDY

This thesis is organized into six chapters. Chapters II and III provide essential background and a literature review for understanding the context to the data analysis. Chapter IV describes the data gathered and highlights preliminary findings from an analysis focusing on differences between the means of the variables. Chapter V highlights the statistical methodology for analyzing the factors that predict selection to LtCol, and presents the results. Finally, Chapter VI formulates conclusions and recommendations based on the analysis and the results presented in this thesis.

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II. BACKGROUND

The quality of an employee is a difficult concept to succinctly define and measure quantitatively. Personnel quality incorporates many individual traits not easily quantified or objectively measured. The United States Marine Corps (USMC) actively attempts to measure and select for promotion only those officers deemed to be the highest quality. One important source of information on officer quality is the Marine Corps' Fitness Report (FITREP) system, which is the primary metric used by the various boards that make decisions on Marine officers over their careers. Marines are scrutinized on at least one or, more likely, several boards in their careers. Some examples of boards include career designation boards (CD), promotion boards, and the Commandant's Career Education Board (CCLEB). Each board attempts to identify the highest quality officers among the candidates eligible for retention or selected for special assignment.

This thesis focuses on promotion to LtCol as one important indicator of career success in the Marine Corps. Promotion to LtCol is the first time in a Marine officer's career the selection opportunity drops from approximately 90% to approximately 65%. This opportunity shift represents a more competitive board, which in turn requires that those who are selected for promotion be the highest quality among those eligible. At the rank of LtCol, an officer is also screened for major command, such as an infantry battalion or aviation squadron. Each command entails tremendous responsibility and requires the most capable, experienced, and motivated officers. The LtCol promotion board occurs when an officer has approximately 16 years of time-in-service and approximately five years of time-in-grade as a Major. The selection standard from the precept of the fiscal year 2013 (FY13) LtCol board (2011) is explained as follows:

The board shall carefully consider, without prejudice or partiality, the record of every eligible officer. The officers selected will be those officers whom a majority of the members of the board consider best qualified for promotion. In addition to the standard of best qualified, the officers recommended for promotion by the board must be fully qualified; that is, each officer's qualifications and performance of duty must clearly demonstrate that the officer would be capable of performing the duties

normally associated with the next higher grade. This standard applies to all eligible officers, including those above- and below-zone. (p. 3)

The precepts will differ from year to year, but each precept has similar, if not the exact same, selection standard guidance. The promotion boards are limited in how many officers are selected for promotion as designated by Title 10 of the United States Code (U.S.C.), the Defense Officer Personnel Management Act (DOPMA), as well as by additional guidance from the Secretary of Defense (SecDef), Secretary of the Navy (SecNav), and the Commandant of the Marine Corps (CMC), (HQMC, 2006, p.1–3). These authorities regulate the breadth of officer promotions at every rank ensuring the proper number of officers in each grade. Managing officer in-grade limits creates a pyramid-type personnel structure that fosters competition for promotion. This thesis will explore quantifiable characteristics of Majors eligible for promotion to LtCol of the most recent five boards (FY13-FY17) to identify factors associated with high potential for successful promotion.

A. OFFICER CAREER PATHS

The Marine Corps has three distinct types of Military Occupational Specialty (MOS): ground combat, aviation, and combat support. These categories are broad and encompass many primary occupational specialties. As such, this thesis further disaggregates MOS groups to add one category for aviation-ground MOSs and one category for specialized MOSs, such as lawyers and acquisition specialists. Each field has different career checkpoints and opportunities to serve. Therefore, there is no set path for an officer to follow to guarantee promotion to LtCol. However, an officer's career will consist of time spent in the fleet, in a B-billet, and at Professional Military Education (PME).

1. After Commissioning

Marine officers begin their commissioned service at The Basic School (TBS) where they learn skills necessary to be a standard rifle platoon commander. From the TBS website:

Train and educate newly commissioned or appointed officers in the high standards of professional knowledge, esprit-de-corps, and leadership to prepare them for duty as company grade officers in the operating forces, with particular emphasis on the duties, responsibilities, and warfighting skills required of a rifle platoon commander. (HQMC, 2016)

Following TBS, the officer proceeds to his or her Primary MOS (PMOS) school for training in their occupational specialty. MOSs are designated by four-digit numbers that are associated with particular line numbers in a unit's table of organization. The length of each school varies depending on the technical expertise required. For example, a 7210 Air Defense Control Officer MOS school is approximately three months long, whereas a 7509 AV-8B Harrier Pilot MOS can spend around two years completing all the phases of flight school.

2. First Fleet Marine Force Tour

At the completion of their PMOS training, officers report to their first Fleet Marine Force (FMF) unit. FMF designates units that serve as the operators, or "warfighters," of the Marine Corps. Typical first tours last approximately three years, with the possibility of extending for an additional year or another full three-year tour, dependent on the needs of the Marine Corps. During this tour, the officer will typically deploy at least twice, if not more. Deployments can range from a standard six-month Marine Expeditionary Unit (MEU) float to an unspecified length Special Purpose-Marine Air Ground Task Force (SP-MAGTF). Each deployment provides different experiences in regards to operations, from shipboard to ground-based missions. These deployments offer officers an opportunity to hone skills, develop as leaders, and receive performance evaluations as junior officers. At some point in this first tour, the officer will be promoted the rank of Captain. Another milestone most officers see in this tour is the CD board. Officers are eligible for this board once they gain 540 days of observed FITREPs and have been considered for Captain. The Marine Corps Order governing the CD board (2008) states: "Career designation accomplishes the objectives of retaining the best qualified officers on active duty and maintaining the AC [active component] officer population in each year of commissioned service (YCS) at a level that supports the

promotion timing and opportunity guidelines to Major” (p. 2). An example of an infantry officer’s first tour would be serving as a platoon commander in the FMF.

3. B-Billet

The Marine Corps prefers to have well-rounded officers. Thus, it is not necessarily career enhancing to do back-to-back FMF tours. B-billets offer an opportunity for Marine officers to serve in a supporting unit for approximately three years. This allows the officer to “reset” after operating in a high-tempo environment with the FMF. Officers gain additional perspective and experience through their B-billets, which can be utilized when they return to the FMF. There is a wide array of B-billets available; however, many of them require specific PMOS training. Units in support of the FMF fall into the following categories: training, staff, and acquisition. Many Captains will go to instructor billets, at the various MOS schools or TBS, to pass on their experience to the next crop of junior officers. Some Captains will go to staff billets that ensure the Marine Corps continues to run while the FMF is operating in the rest of the world. Other billets make sure the FMF is supplied with whatever it needs to operate, be it more personnel or more bullets. A standard B-billet for an aviator would be a tour in a Fleet Replacement Squadron (FRS) or in flight school where they will produce qualified pilots for the FMF.

4. Professional Military Education

Since 2011, the Marine Corps has instituted a CCLEB each year. This board evaluates and selects officers, Captains and First Lieutenants, from eligible movers (officers ending their current tour) to attend an education program. From the Commandant’s Education Boards website, the programs available are

- Resident Professional Military Education (PME)
- Congressional Fellowship Program (CFP)
- Foreign Area Officer (FAO) Program
- The Judge Advocate General’s Legal Center and School (TJAGLCS)
- Olmsted Scholar Program (OSP)

Graduate Education Programs (Special Education and Advanced Degree)
(HQMC, 2016)

Expeditionary Warfare School (EWS) offers resident PME for Captains. This is the first professional school in a Marine officer's career. Successful completion is required for promotion; however, it is not mandatory for an officer to attend the resident course.

5. Second FMF Tour

Upon completion of a B-billet tour, an officer typically returns to the FMF for another tour. This tour consists of billets that hold more responsibility. At this point in officers' careers, they are meeting the necessary requirements for the next rank. In aviation, officers continue their progression through upper-level qualifications, often becoming instructors. On the ground side, officers expect to hold Company Commander Billets. During this tour, officers should be approaching the next competitive promotion board to Major. Officers will be evaluated for promotion based on their performance as a Captain in the FMF and in a B-billet.

6. Second B-billet Tour/Commandant's Professional Intermediate Board

As with the completion of their initial tour, another B-billet assignment is standard following their second FMF tour. This tour is typically another supporting establishment billet or selection for the Commandant's Professional Intermediate Board (CPIB). This board mirrors the CCLEB process but focuses on Majors and will select to Command and Staff College (CSC) vice EWS in addition to the other programs listed previously. Marines that are progressing through the ranks will more than likely attend resident PME at some point in their career.

7. Third FMF Tour

The third FMF tour consists of Majors serving in department head billets. A department head billet is considered Executive Officer, Operations Officer, or additionally in aviation as a Maintenance Officer. These billets hold much responsibility and leadership opportunity. Successful completion also represents a point in a career where the Marine has met all the PMOS training requirements and qualifications

experience necessary for the next rank, LtCol. Serving in a department head capacity is the critical milestone for promotion to the next rank, and it falls on the Marine Corps' manpower division to ensure that officers are afforded the opportunity to meet that milestone. This is not always an option, so it behooves the officers themselves to keep an eye on their career progression. During or following this tour, an officer typically becomes eligible for promotion to LtCol.

B. PROMOTION PROCESS

Every fiscal year the Marine Corps holds several promotion boards for officers. The promotion process starts with a Marine Administrative (MARADMIN) message that alerts all officers of the date of the board. From there is up to the individual officers who suspect they will be eligible for promotion to meet the requirements set in the MARADMIN. Then another MARADMIN is sent out approximately one month before the board convenes delineating three zones that contain eligible officers. After convening, the board reviews the officers based on merit and selects those based on the board guidance. That guidance comes in the form of a precept designed specifically for that board. Once the board is complete, the results are submitted through a post-board vetting process before finally releasing the results to their waiting audience.

1. Promotion Guidance MARADMIN

This MARADMIN is typically released in the spring prior to the board and is intended to give ample time for eligible officers to make sure their records are in order. The *Marine Corps Promotion Manual* describes this MARADMIN: "In addition to the board convening dates, this message will contain information on reviewing and updating an officer's Official Military Personnel File (OMPF), instructions on submitting photographs, and other administrative instructions that are applicable to all promotion boards" (HQMC, 2006, p. 2–3). An officer can gauge their eligibility window by reviewing the promotion board message for the time-in-grade (TIG) when each particular rank approximately is to appear on the promotion board, as seen in Figure 1.

4. ELIGIBILITY FOR CONSIDERATION FOR PROMOTION. TIME-IN-GRADE (TIG) AND OTHER REQUIREMENTS.		
A. OFFICERS MAY NOT BE CONSIDERED FOR PROMOTION TO THE NEXT HIGHER GRADE IN ANY ZONE UNTIL THE OFFICERS COMPLETE THE MINIMUM TIG AS SPECIFIED BELOW. THE MINIMUM TIG MAY BE WAIVED BASED ON THE NEEDS OF THE MARINE CORPS.		
GRADE	CONSIDERED FOR SELECTION TO	TIG
BRIGADIER GENERAL	MAJOR GENERAL	1 YEARS TIG
COLONEL	BRIGADIER GENERAL	1 YEARS TIG
LIEUTENANT COLONEL	COLONEL	3 YEARS TIG
MAJOR	LIEUTENANT COLONEL	3 YEARS TIG
CAPTAIN	MAJOR	3 YEARS TIG
FIRST LIEUTENANT	CAPTAIN	NO MINIMUM TIG
CWO 2, 3, 4	CWO 3, 4, 5	2 YEARS TIG
THIS INFORMATION IS PROVIDED IN AN EFFORT TO PROVIDE OFFICERS AN APPROXIMATE INDICATION OF WHEN THEY MAY EXPECT TO BE CONSIDERED FOR PROMOTION. AN OFFICER'S ELIGIBILITY FOR CONSIDERATION FOR PROMOTION IS DETERMINED AS OF THE DATE THE BOARD CONVENES. IF AN OFFICER'S DOR IS SUCH THAT HE OR SHE WILL MEET THE MINIMUM TIG BY THE CONVENING DATE OF THE BOARD, THEN THE OFFICER IS ADVISED TO PREPARE FOR CONSIDERATION AND ENSURE AMPLE TIME IS ALLOWED TO REVIEW HIS OR HER RECORD. INFORMATION ON PREPARING FOR A PROMOTION BOARD IS AVAILABLE AT THE OFFICER PROMOTION HOMEPAGE.		

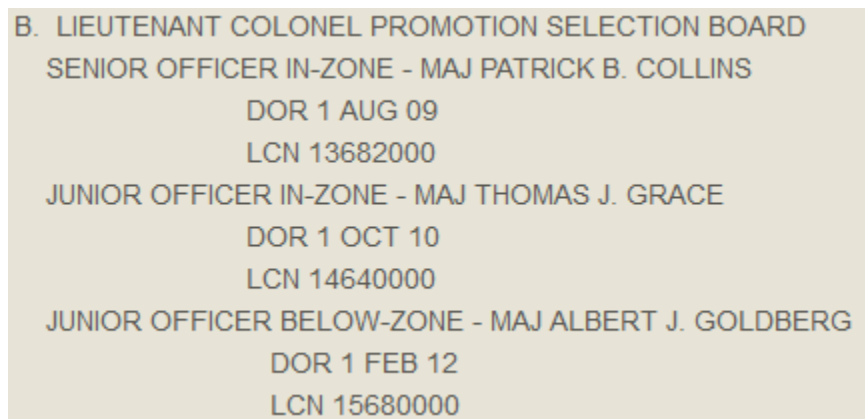
Figure 1. TIG Requirements for Promotion. Source: HQMC (2015).

If an officer meets the TIG requirement, there is a possibility of being considered for promotion. There are three distinct “promotion zones,” and they are decided by an officer’s Lineal Control Number (LCN). The LCN is assigned to officers based on their performance at TBS. The promotion manual describes the assignment, “Precedence numbers are assigned to all second lieutenants, including graduates of a Service academy, according to the order of their overall class average (expressed to the nearest thousandth of a percent) at The Basic School. In the event of a tie, officers are ranked among themselves according to their class average in leadership at The Basic School” (HQMC, 2006, p.1–8). The precedence number is added to Marine Corps Bulletin (MCBUL) 1400 (or the “Blue Book”), which is updated every year to reflect all Marine officers’ lineal standing.

2. Convening MARADMIN

No later than 30 days prior to the convening of the promotion board, another MARADMIN will be released giving the LCN parameters for three promotion zones: Above, In, and Below. Each zone correlates with a specific group of officers and the convening message sets the senior and junior officer of each zone. “Above-Zone officers

have been previously considered in the In-Zone population, and failed selection for promotion by a regularly scheduled board” (HQMC, 2006, p.1-15). If Above-Zone officers fail to select for promotion, then they face another board, immediately following the promotion board, that judges whether they can continue in the Marine Corps at their current rank or if they will be processed for separation. “In-Zone officers have neither failed selection for promotion nor been removed from a promotion list. In-Zone officers comprise the primary eligible population for consideration by the selection board” (HQMC, 2006, p.1-15). In-Zone officers are Marines who are at the perfect timing for promotion; they have the proper TIG and have met all of the other requirements to be eligible for promotion. Some officers will appear in the Above-Zone category (based on timing) when they should have appeared In-Zone. This is due to external factors affecting the end-strength requirements of the force. The officers that fall into the Above-Zone category without being assessed in the In-Zone category are identified to the board and given the same consideration as if they were In-Zone. “Below-Zone officers are junior to the most junior officer in the promotion zone (In-Zone). Below-Zone officers are eligible for consideration, but if not selected, they will not incur a failure of selection” (HQMC, 2006, p.1–15). These officers may meet all the requirements but they fall below the In-Zone officers in the “Blue Book” lineal precedence list. The officers that are Below-Zone can reasonably expect to be In-Zone on the next year’s board. Figure 2 shows an example of the zone parameters.



B. LIEUTENANT COLONEL PROMOTION SELECTION BOARD	
SENIOR OFFICER IN-ZONE - MAJ PATRICK B. COLLINS	
DOR 1 AUG 09	
LCN 13682000	
JUNIOR OFFICER IN-ZONE - MAJ THOMAS J. GRACE	
DOR 1 OCT 10	
LCN 14640000	
JUNIOR OFFICER BELOW-ZONE - MAJ ALBERT J. GOLDBERG	
DOR 1 FEB 12	
LCN 15680000	

Figure 2. Zone Definition Example. Source: HQMC (2016).

The zones' sizes are decided in an annual promotion plan created by the USMC Manpower Plans and Policy division. "The plan serves as a planning tool for the development of each selection board. The plans contain selection opportunities, zone sizes, numbers authorized to select, and any skill guidance for each grade and competitive category" (HQMC, 2006, p.1–12). The plan takes into consideration projected vacancies in each grade over the next year and the estimated number of officers to fill those vacancies. The promotion zones are then sized to allow for promotion opportunity as required by DOPMA each year.

3. The Board

Promotion boards are comprised of a select number of officers of ranks senior to that of the rank under consideration by the board. For example, only Colonels or higher can be on the board to select LtCols. The board members should represent fairness in terms of diversity, MOS, and ranks. The board is headed by the president, who is selected by the board precept, which is the legal document that convenes the board. The precept also provides guidance from the Secretary of the Navy on factors that are deemed important to be considered when selecting officers for promotion.

4. Precept

The precept lays out parameters for officer selection and authorized promotion numbers for each board. Guidance regarding how the board should consider certain items is addressed, such as manning shortages by skill area. The skill-guidance section, in Figure 3, shows critically short MOSs and states that the needs of the Marine Corps be considered when selecting officers who are "best and fully qualified."

<u>MOS</u>	<u>SKILL</u>	<u>PERCENTAGE SHORT OF REQUIREMENT</u>
0180	Adjutant	10%
5803	Military Police	16%
6002	Aircraft Maintenance	43%
7532	MV-22 Pilot	32%

Figure 3. Critical MOS Example. Source: Secretary of the Navy [SECNAV] (2011)

It is important to note that while the precept offers guidance on critically short MOSs or on other aspects of a Marine's career that should be considered by the board, it is not setting a quota on anything other than the number of Marines authorized to be selected. The precept also provides guidance for how the board members should comport themselves during the board. It sets out rules of behavior and considerations for the board members to take into account while voting.

There are four phases of case preparation and briefing as outlined in the *Marine Corps Promotion Manual, Volume 1*. Each case is a briefing sheet compiled about an officer's career to highlight significant events, billets, or data describing who the officer is to the board. The first phase is case preparation in which the background information on all In-Zone officers is prepared and reviewed by board members. This allows the members to evaluate the competitiveness of the In-Zone officers. In the next phase, the process is repeated with both Above-Zone and Below-Zone officers. The members can evaluate whether or not an officer from one of these two zones is comparable to those who are In-Zone.

5. Board Convenes

Next, in phase three, the board begins what is termed an executive session that consists of only board members and recorders. In this session, the board members will brief each case from Above-Zone and Below-Zone officers to determine if they merit being considered for promotion with In-Zone officers. The cases are then collected, and board members are given time to fully prepare prior to the full briefing and voting session.

In the final phase, each case is briefed fully; Figure 4 provides an example of a case brief to the board. The brief sheet contains information the Marine Corps deems pertinent to a Marine's career history, including comment highlights from FITREPs. It allocates time for any adverse material to be briefed and for board members to speak about the specific case. At this point, the members cast a vote on each case as it is briefed. A member may vote "yes" only in accordance with the number of officers authorized to select.

Marine, I.M.									
Briefing Guide									
MBS New									
MBS Old									
RS/RO Summary									
Performance									
Comm/Dera									
Service									
NAME	SSN	RANK	DOR	BRIEF ADV	CURRENT DUTY ASSIGNMENT	BILLET DESCRIPTION	DCTB	LTR 2 BDP	PRECEP
999999917	Unknown	20050101	5				20030717	N	N
APPEARANCE		PMOS		MILITARY OCCUPATIONAL SPECIALTIES		TRAINING SUMMARY		LANGUAGES	
HEIGHT	70	AMOS1	0302	Infantry Officer	AMOS4	RIFLE	E/223	19000101	
WEIGHT	185	AMOS2			AMOS5	PISTOL	E/373	19990101	
BODY FAT	0	AMOS3			JOINT	PFT	1st/281	20050701	
EXCEEDS	N				BMOS	MCMAP	Tan	20031028	
EDUCATION SUMMARY									
CIVILIAN		MILITARY		PME (Y)					
16	BIOLOGY	93	SUMMER MOUNTAIN LEADERS ADV	97	MARCORPS AMPH WARF				
		93	WINTER MOUNTAIN LEADERS ADV	97	AVS PHASE II				
		90	INFANTRY OFFICER (TBS)	90	AVS PHASE I				
		90	ASSAULT CLIMBERS	94	WARFIGHTING SKILLS PROGRAM				
		89	BASIC SCHOOL	04	MARCORP CMD JT COL				
		87	AIRBORNE						
PERSONAL DECORATIONS									
AC	2003	Maj-Co CO, Bn Ops, Bn Ops, Bn		Joint	Asst Future OpsO (J-3) USCENT COM				
RM	2000	Maj-Co RS Pittsburg		Acquisition					
AC	1996	1st Lt-Pt Cdr, CO XO-A28		Command	Co CO, Bn XO, RS Co				
SA	1999	Capt-Asst OIC/OIC Ops-MWTC		Staff	Bn Ops Off, OpsO MWTC				
				Other					
REMARKS									
1st Lt-Consistently rated number 1, positive remarks, top performer									
Captain:									
DIC Ops MWTC - RS - No 1 of competitive group, compl AWS non-res, rewrote POI, strong character/morals, all around outstanding officer, super captain, tactically and technically sound, RO - recommended for Royal Marine Exchange.									
MWS Resident Student - RS - Honor Grad tactically sound, headed MWTC training group, RO - 'one to have on your team when sending folks in harms way'.									
Pt Cdr OCS - RS outstanding leader, mission oriented, perfect balance btw physical and mental toughness, meticulously polished in every respect.									
Asst OpsO - RS best capt served w/ in past 2 yrs.									
Company Commander - RS one of the strongest combat leaders in the division, head and shoulders above superstar captains, there isn't a chink in his armor, one in a million officer destined for greatness, executed, executed in the finest heliborne assault seen by TTECG at CAX, finest company grade officer with which I've served.									
Major:									
OpsO - RS - strong, dynamic and forceful w/out overpowering peers and subordinates, RO - strong potential for command of infantry battalion.									
Bn XO - RS - performance and proficiency rarely seen in his grade, among most proactive and action oriented officer I've ever observed, should be kept in front of troops at ever level of command, clearly one of the front runners in the Corps, RO - top 10% of majors.									
RS CO - RS - earned RS of the month not done in previous 7 yrs, complete integrity and absolute honesty, calm focused and confident, significant impact in all areas, transformed losing RS to winners via legitimate cultural change, CMC's Superior Achievement Award 1st in 17 yrs for RS pitt, RO - top 5% of officers in Corps not marked properly on RO tree - should be marked higher)									
1st Lt:									
AC/S G-6 - Conscientious, dedicated, dependable and professional Marine Corps leader, who's hallmark is mission accomplishment and personnel welfare.									
Expeditionary Planner -									
GENERAL VALUE									
ABOVE 0									
WITH 0									
BELOW 0									
1 of 1 0									
RV SUMMARY									
At Cu									
UPPER 75.0% 75.0%									
MIDDLE 0.0% 0.0%									
LOWER 25.0% 25.0%									
N/A 1 1									
RO ASSESSMENT									
At Cu									
ABOVE 45.7% 0.0%									
WITH 27.6% 0.0%									
BELOW 26.6% 0.0%									
RECOMMENDATION									
BRIEFER									
MEMBER									
5 - Water Trainer									
5 - W/ Enthusiasm									
4 - W/ Confidence									
3 - W/ Reservation									
2 - Not Recommended									
1 - Show Cause									

Figure 4. Example Brief Sheet for a Promotion Board. Source: Marine Manpower Division Officer Assignments [MMOA] (2017).

Following the final votes, a report is generated detailing the results of the board. From the results, a nomination package is put together and forwarded through the appropriate chain to the approval authority. Specific ranks require different approval

authorities who may take more or less time. Figure 5 is a table that delineates which approval authority each rank and category requires.

MARCORPROMMAN, VOL 1, OFFFROM				
NOMINATION/BOARD REPORT ROUTING				
	SECNAV	SECDEF	PRESIDENT	SENATE
ACTIVE MAJGEN	YES	YES	*YES	+YES
RESERVE MAJGEN	YES	YES	*YES	+YES
ACTIVE BGEN	YES	YES	*YES	+YES
RESERVE BGEN	YES	YES	*YES	+YES
ACTIVE COL	YES	#*YES	YES	+YES
ACTIVE RESERVE COL	YES	#*YES	YES	+YES
RESERVE COL	YES	#*YES	YES	+YES
ACTIVE LTCOL	YES	#*YES	YES	+YES
LDO LTCOL	YES	#*YES	YES	+YES
ACTIVE RESERVE LTCOL	YES	#*+YES	NO	NO
RESERVE LTCOL	YES	#*+YES	NO	NO
ACTIVE MAJ	YES	#*YES	YES	+YES
LDO MAJ	YES	#*YES	YES	+YES
ACTIVE RESERVE MAJ	YES	#*+YES	NO	NO
RESERVE MAJ	YES	#*+YES	NO	NO
ACTIVE CAPT	YES	#*+YES	NO	NO
ACTIVE RESERVE CAPT	YES	#*+YES	NO	NO
RESERVE CAPT	YES	#*+YES	NO	NO
ACTIVE CWO	#*YES	+YES	NO	NO
ACTIVE RESERVE CWO	#*YES	NO	NO	NO
RESERVE CWO	#*YES	NO	NO	NO

A "YES" indicates the nomination must be processed by that specific level of command.

* DENOTES THE APPROVAL AUTHORITY WHICH AUTHORIZES RELEASE OF THE ALNAV ANNOUNCING THE RESULTS.

+ DENOTES THE APPROVAL AUTHORITY WHICH AUTHORIZES PROMOTIONS.

DENOTES THE APPROVAL AUTHORITY WHICH AUTHORIZES PROMOTIONS AND THE RELEASE OF THE ALNAV ANNOUNCING THE RESULTS OF A SPECIAL SELECTION BOARD.

Figure 5. Promotion Approval Process Source: HQMC (2006).

6. Promotion

Once selected and approved by the appropriate authority, an officer is first notified by his or her Commanding Officer. After this personal notification, the official All Navy Message (ALNAV) is released for public consumption. The message release is the completion of the selection process, but it does not officially promote the officer to the next rank. The Marine Corps Manpower Plans department decides who is promoted on the authority of the Commandant. The promotion manual states that “promotion plans authorize the selection of officers for promotion based on estimated vacancies in that grade. Promotion of selected officers will be authorized on a monthly basis to fill vacancies for that grade in that month” (HQMC, 2006, p. 6–3). Each month the Commandant authorizes the release of a promotion MARADMIN that lists the officers to be promoted on the first of the next month. This message also forecasts the range of officers to be promoted on the first of the following month. The promotion process is approximately four months long from start to finish.

C. FITNESS REPORTS

At each step in an officer’s career, he or she is challenged to excel in their performance and is evaluated based on that performance. The fitness report (FITREP) system is an attempt to capture performance annually and at key junctures in an officer’s career. According to the *Performance Evaluation System (PES) manual* commander’s intent: “The fitness report provides the primary means for evaluating a Marine’s performance to support the Commandant’s efforts to select the best qualified personnel for promotion, career-designation, retention, resident schooling, command, and duty assignments” (HQMC, 2015, p.2). Promotion boards take those evaluations and select which officers meet quality metrics, guidelines set by precept, and regulations set by DOPMA. FITREPs have been explored at length in several studies and master’s theses, thus in this thesis it will only be discussed in general.

1. General Layout

The FITREP consists of 12 sections labeled A-L, which are completed by the Reporting Senior (RS). The RS is the officer responsible for writing the FITREP and

ensuring its accuracy. Section A covers general administrative details that delineate items such as the period the FITREP is covering and any weapon and physical test scores. The next section is a block for a written description of the Marine Reported On's (MRO) billet, which is followed by a section listing the accomplishments relating to that billet description. The next five sections are for measuring the MRO's ability in different categories. This measurement is a quantitative assessment of Mission Accomplishment, Individual Character, Leadership, Intellect and Wisdom, and Fulfillment of Evaluation Responsibilities. In each of the sections there are subsections addressing specific aspects of the block. These subsections provide detailed standards to be used by the RS in evaluating the MRO.

The four main sections for measuring an MRO's ability are of interest in this thesis. Within the four sections are 13 attributes, which are assigned a score between one and eight, with one being the lowest score. Each attribute has a specific definition, from the *Performance Evaluation System (PES) Manual*, on which to evaluate the level of competency of an individual.

- **Mission Performance:** Results achieved during the reporting period. How well those duties inherent to a Marine's billet, plus all additional duties, formally and informally assigned, were carried out. Reflects a Marine's aptitude, competence, and commitment to the unit's success above personal reward. Indicators are time and resource management, task prioritization, and tenacity to achieve positive ends consistently.
- **Mission Proficiency:** Demonstrates technical knowledge and practical skill in the execution of the Marine's overall duties. Combines training, education, and experience. Translates skills into actions, which contribute to accomplishing tasks and missions. Imparts knowledge to others. Grade dependent.
- **Individual Courage:** Moral and physical strength to overcome danger, fear, difficulty or anxiety. Personal acceptance of responsibility and accountability, placing conscience over competing interests regardless of consequences. Conscious, overriding decision to risk bodily harm or death to accomplish the mission or save others. The will to persevere despite uncertainty.
- **Effectiveness Under Stress:** Thinking, functioning and leading effectively under conditions of physical and/or mental pressure. Maintaining composure appropriate for the situation, while displaying

steady purpose of action, enabling one to inspire others while continuing to lead under adverse conditions. Physical and emotional strength, resilience and endurance are elements.

- **Initiative:** Action in the absence of specific direction. Seeing what needs to be done and acting without prompting. The instinct to begin a task and follow through energetically on one's own accord. Being creative, proactive and decisive. Transforming opportunity into action.
- **Leading Subordinates:** The inseparable relationship between leader and led. The application of leadership principles to provide direction and motivate subordinates. Using authority, persuasion, and personality to influence subordinates to accomplish assigned tasks. Sustaining motivation and morale while maximizing subordinates' performance.
- **Developing Subordinates:** Commitment to train, educate, and challenge all Marines regardless of race, religion, ethnic background, or gender. Mentorship. Cultivating professional and personal development of subordinates. Developing team players and esprit de corps. Ability to combine teaching and coaching. Creating an atmosphere tolerant of mistakes in the course of learning.
- **Setting the Example:** The most visible facet of leadership is how well a Marine serves as a role model for all others. Personal action demonstrates the highest standards of conduct, ethical behavior, fitness, and appearance. Bearing, demeanor, and self-discipline are elements.
- **Ensuring Well-Being of Subordinates:** Genuine interest in the well-being of Marines. Efforts enhance subordinates' ability to concentrate/focus on unit mission accomplishment. Concern for family readiness is inherent. The importance placed on welfare of subordinates is based on the belief that Marines take care of their own.
- **Communication Skills:** The efficient transmission and receipt of thoughts and ideas that enable and enhance leadership. Equal importance given to listening, speaking, writing, and critical reading skills. Interactive, allowing one to perceive problems and situations, provide concise guidance, and express complex ideas in a form easily understood by everyone. Allows subordinates to ask questions, raise issues and concerns, and venture opinions. Contributes to a leader's ability to motivate as well as counsel.
- **Professional Military Education (PME):** Commitment to intellectual growth in ways beneficial to the Marine Corps. Increases the breadth and depth of warfighting and leadership aptitude. Resources include resident schools; professional qualifications and certification processes; non-resident and other extension courses; civilian educational institution

course work; a personal reading program that includes (but is not limited to) selections from the Marine Corps Professional Reading Program; participation in discussion groups and military societies; and involvement in learning through new technologies.

- **Decision Making Ability:** Viable and timely problem solution. Contributing elements are judgment and decisiveness. Decisions reflect the balance between an optimal solution and a satisfactory, workable solution that generates tempo. Decisions are made within the context of the commander's established intent and the goal of mission accomplishment. Anticipation, mental agility, intuition, and success are inherent.
- **Judgment:** The discretionary aspect of decision making. Draws on core values, knowledge, and personal experience to make wise choices. Comprehends the consequences of contemplated courses of action. (HQMC, 2015, p.4-23)

The scores assigned to the attributes are then averaged to produce the report average. This number is then used to calculate the report's relative value based on the evaluation history of the reporting senior. This thesis pays particular attention to the quantitative metrics viewed by the promotion boards and the factors that go into those metrics.

The next two sections are for RS comments and certification. This block gives the RS space to add comments on the MRO's performance that cannot be captured or that are amplifying in nature. Although there is no standard for how to write comments, the *Performance Evaluation System (PES) Manual* contains instructions for the RS to follow. These instructions provide guidance on what type of comments to add and what type to omit. Certain items in previous sections may require clarification and the RS is directed to write these clarifying comments.

The Reviewing Officer (RO) also gets a section for rating/comments and one for certification. The RO is the superior to the RS and typically is the Commanding Officer of the unit. The reason for the RO comments is to provide depth and experience to the report. The RO is required to "rack-and-stack" or compare the MRO to all Marines of the same grade that RO has been able to observe. This comparison takes place on a scale that mimics a Christmas tree shape, with the highest performers being at the top and the

lowest at the bottom. The idea behind this type of scale is to identify when an officer is performing on par with rank or further ahead. In addition to the rating, the RO will write comments using the same guidelines as the RS. Again, the RO will certify that comments are truthful and without bias. The final section is an addendum block in which the RS and RO can provide further comments if necessary. Appendix C contains an example of a FITREP.

D. SUMMARY

The rules that govern the LtCol board selections presented in this chapter will provide valuable input modeling the selection multivariate regressions. The next chapter presents the most recent and relevant previous studies that help define the analysis framework of this thesis. By discovering actual characteristics through regression analysis, this thesis will be able to identify which factors are the most important to promotion to LtCol. This promotion identifies Marine officers that embody Marine Corps quality, thus the factors that are most prevalent in those Marines promoted to LtCol are factors that can be associated with quality.

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III. LITERATURE REVIEW

A. INTRODUCTION

Research efforts to identify factors associated with quality of officers are not new. Several prior studies aimed to identify predictors of officer performance. However, the majority of prior studies use those factors to compare one group with another. This thesis does not seek to compare groups; rather, this thesis aims to identify, in general, those Marine officer characteristics that are significantly associated with success, with the primary metric for success being promotion to LtCol. The review of the prior literature is relied on to specify the multivariate models used to analyze promotion outcomes. The goal of this thesis is to analyze specific background factors that affect promotion to LtCol. The following studies each aid with model specification and the identification of variables that may be important determinants of officer performance.

Salas (2015) provides good insight and examples for how to characterize variables for binary promotion and retention models. Reynolds (2011) helps guide how to build the officer samples used in this study. He began with an overall sample but restricted it multiple times and adjusted the estimating model in the restricted samples. The model specification in Garza (2014) is also used to guide the model specification in this thesis. The structure by Garza is important because it allows for a step-by-step introduction of variables to analyze how each set of factors affects the others and the predictability of certain factors. A Center of Naval Analysis (CNA) (2012) study provides insight into key promotion determinants and lends background to how much weight is put behind FITREPs in analyzing promotion and retention. This will help in the definition of the FITREP variables as well as the model specification for estimating the effect of the FITREP variables. The studies that are reviewed were chosen specifically to provide a solid baseline for the research design adopted in this thesis.

B. SALAS (2015)

Salas (2015) examined individual demographic characteristics that might explain differences in officer career milestones, focusing specifically on differences between

Hispanic and non-Hispanic Marine officers. The purpose of Salas' research was to gather useful information that might guide policies that would improve retention, promotion, and FITREP performance of Hispanic officers. The Military Leadership Diversity Commission (MLDC) submitted a report in 2011 that outlined several recommendations to improve processes associated with the promotion and retention of officers (MLDC, 2012). In line with the MLDC, the goal of Salas' research was to provide information to support the commission's recommendations.

Salas used multivariate regression models to examine individual background characteristics that would predict any differences between Hispanic and non-Hispanic officer in promotion to Major and retention outcomes. His data came from three sources: TFDW, Manpower Management Records and Performance Evaluation section (MMRP-30), and the CNA. These sources were combined to generate a longitudinal dataset on several cohorts of officers, reporting of 92 variables on each officer in the data set. Salas (2015) points out that, "The full data set contains 7,880 individuals who represent the population of Marine Corps officers that commissioned in calendar years 1999 to 2004" (p.37). The officers were followed annually, over their career, from commissioning until the promotion to Major, or until separation. The 92 variables captured demographic and career characteristics of each individual. Some examples of the variables are college academic performance, awards, physical fitness scores, and FITREP averages.

The data was organized in different tiers representing stages in an officer's career, beginning with the pre-accession period, followed by TBS, and Post-TBS periods. Each of the tiers would ideally determine what factors were most important in predicting outcomes at the different points in an officer's career. Salas examined three separate outcomes: retention, promotion to Major, and FITREP performance. The dependent variables for the retention and promotion models were binary and were analyzed using non-linear probit regression models. Retention was measured at the end of six years of service and at the end of 10 years of service. The RS cumulative score from the FITREP was analyzed using a linear Ordinary Least Squares (OLS) model. In the 6-year retention model, aviators and lawyers were not included in the sample of analysis because their initial obligated service requirements take them past the six-year career mark. However,

both aviators and lawyers were included in the 10-year retention model sample because their initial obligations expire during this period. The models were estimated using the pooled data as well as Hispanic and non-Hispanic officer groups, separately, to identify the differences in how each variable predicted the outcomes for the two groups.

The results identified several factors that were significantly associated with a higher promotion or retention rates, and better FITREP scores. Salas found in both the six-year and 10-year retention models that Hispanics had a higher retention rate than non-Hispanics. Table 1 shows the results of the 10-year retention models, estimated separately for Hispanics and non-Hispanics, from Salas (2015). The coefficients, listed under the panels “M.E. (non-Hispanics)” and “M.E. (Hispanics),” represent marginal effects of the explanatory variables on the 10-year retention outcomes. The marginal effect represents the effect on a one-unit change in the independent variable on the probability of the outcome (Wooldridge, 2013, p.854). The overall probability of 10-year retention for Hispanics was 80.1 percent versus 74.7 percent for non-Hispanics. Salas also found no significant differences in the promotion probabilities to Major among Hispanics and non-Hispanics. The results from the 6-year, and 10-year retention models allow Salas (2015) to conclude that “Hispanics are treated no differently than non-Hispanics in terms of these outcome variables” (p.87).

Table 1. Probit 10 Year Retention Model Results for Hispanic and Non-Hispanics. Source: Salas (2015)

VARIABLES	M.E. (non-Hispanics)	M.E. (Hispanics)	VARIABLES	M.E. (non-Hispanics)	M.E. (Hispanics)
Female	-0.0142	0.0871**	air_mos	0.2321***	0.1051***
	(0.0256)	(0.0426)		(0.0137)	(0.0407)
AGEatCOMM	0.0137***	0.0174*	PFT_10	-0.0004	0.0005
	(0.0032)	(0.0098)		(0.0003)	(0.0010)
Naturalized	0.0865**	0.1308***	HiRifQualYOAS_10	0.0657***	0.0920**
	(0.0400)	(0.0345)		(0.0120)	(0.0413)
GCT	-0.0003	0.0015	HiPisQualYOAS_10	0.0271**	0.0019
	(0.0008)	(0.0030)		(0.0113)	(0.0362)
TopColl	-0.0493***	-0.0822*	InjWounded_10	0.0016	-0.0451
	(0.0135)	(0.0449)		(0.0252)	(0.0736)
PriCollege	-0.0214	-0.1181**	Awards_10	0.0112***	0.0098*
	(0.0147)	(0.0581)		(0.0017)	(0.0052)
Academy	-0.0195	-0.0083	SeaServRib_10	0.0650***	0.0507**
	(0.0218)	(0.0696)		(0.0071)	(0.0218)
NROTC	-0.0067	-0.0872	AvgRV_Cum_10	0.0114***	0.0038
	(0.0206)	(0.1021)		(0.0023)	(0.0079)
MECEP	0.1329***	0.1128**	commission 2000	0.0219	-0.0440
	(0.0175)	(0.0469)		(0.0215)	(0.0798)
PLC	0.0398**	-0.0556	commission 2001	0.0101	-0.0239
	(0.0182)	(0.0751)		(0.0223)	(0.0754)
BacSTEM	0.0172	0.0759*	commission 2002	-0.0106	0.0232
	(0.0145)	(0.0391)		(0.0225)	(0.0670)
tbs_overall_gpa	0.0029	-0.0063	commission 2003	-0.0281	-0.1155
	(0.0022)	(0.0071)		(0.0238)	(0.1041)
css_mos	0.0916***	0.0554	commission 2004	-0.0070	-0.1014
	(0.0155)	(0.0494)		(0.0224)	(0.0950)
avgrd_mos	0.1354***	0.0523	Observations	4,746	338
	(0.0175)	(0.0581)			
law_mos	0.1450***	0.0762	Hispanic obs. P		0.801
	(0.0177)	(0.0672)	non-Hispanic obs. P	0.747	

Marginal Effect (M.E); Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

An OLS model was used to analyze the effect of the independent variables on the RS cumulative score, which is the average score for a given RS from all reports on file. When Salas applied the model to the sub-samples of Hispanics and non-Hispanics he found several common significant variables. These variables were approximately the same in magnitude and direction, which indicates effects on performance were similar between Hispanics and non-Hispanics. However, among the positive results, the

explanatory variable effects for non-Hispanics tended to be larger than for Hispanics. Salas' econometric models found no evidence of differences neither in promotion rates nor in FITREP scores between Hispanics and non-Hispanics in Marine Corps officers.

C. REYNOLDS (2011)

Another master's thesis from the Naval Postgraduate School by Reynolds (2011) studied factors that affected the promotion to LtCol of naval aviators (NAs) and naval flight officers (NFOs). The primary question Reynolds (2011) posed was: "What is the probability of promotion to lieutenant colonel for a Marine Corps officer of the aviator MOS (75XX), compared to officers of other MOSs within the USMC?" (p.3). The thesis specifically sought to identify whether or not there were lower promotion rates for NAs and NFOs versus other specific MOS officer communities.

Similar to Salas' data sources, Reynolds used data from TFDW, Marine Manpower Promotion Branch (MMPR), and Marine Manpower Support Branch (MMSB) (N=8,271). According to Reynolds (2011), "These data sources were chosen to effectively replicate the composition of promotion selection populations in candidate samples and factors that influence selection to O-5" (p.37). These data sources contain much of an officer's performance that can be used to predict officer performance and quality. A total of 180 variables were organized into six categories: Demographics, MOS, Training and Education, Performance, Experience, and Promotion Boards and Zones. The variables were included as explanatory variables in regression models to analyze whether there is an "aviation effect" on promotion to LtCol (Reynolds, 2011, p.70).

The models utilized in Reynolds' study are multivariate probit models that are best suited to analyze binary outcomes. Several models were estimated for the three samples: the Full sample, the In-Zone sample, and the Aviation-Only sample. The Full sample is used to provide an initial statistical test of the "aviation effect" on promotion (Reynolds, 2011, p.104). Reynolds then restricted the full sample to create the In-Zone sample to test the effect of being an aviator. Last, he restricts the sample to Aviation-Only to measure effects between different aviation communities. The samples were analyzed by using a baseline model that was refined by adding explanatory variables in

the different categories. In particular, MOS, Education, Experience, and Performance variables could be expanded in future studies to test the explanatory power of the baseline model.

The results, in general, show that an “aviation effect” did exist in promotion to LtCol. Specifically, Reynolds discovered that NAs and NFOs were at a promotion probability disadvantage of 7.6 percentage points when compared to non-aviation MOSs. The results also confirm that strong performance on FITREPs, physical fitness, and completion of PME are associated with higher promotion.

The models used in Reynolds’ study provide econometric and theoretical support for the specification of the models in this thesis. His models were designed to test a specific hypothesis, and the models in this thesis will be specified in a similar manner to capture how a particular category of variables affects promotion. While the methods used to analyze the data will be similar, the samples separate with no overlap and are subject to different external factors. Additionally, this thesis analyzes the specific attribute values found on officer FITREPs, which have not been previously scrutinized at this level.

D. GARZA (2014)

Beyond a normal promotion, board there is another filter through which Marine officers are screened for quality. CD boards are designed to select officers for retention that are best qualified (HQMC, 2008, p.3). Garza (2014) analyzed the factors that predict successful career designation in order to “give career counselors, monitors, commanding officers, executive officers, company commanders, and most importantly, career designation eligible officers the ability to isolate a variable and to show the effect it has on career designation” (p.3). The idea behind the Garza study is to aid officers in identifying areas where they can improve and remain competitive.

Garza’s (2014) primary research question was straightforward: “What characteristics are significant in predicting officer selection to career designation in the USMC?” (p.4). Through the use of multivariate probit models he sought to identify the most important factors associated with successful career designation. Like the previous two studies, his data came from standard USMC data sources. TFDW provided 83

variables, MMSB contributed 13 variables, and MMOA formed the initial population and dependent variable (career designation outcome). Garza organized the data in a similar method as Salas, utilizing five categories of explanatory variables: demographics, commissioning, MOS, performance, and experience.

Garza created five models, with each progressive model added another category of explanatory variables. These five models were sequentially applied to the competitive categories in each CD board and evaluated for changes in the marginal effects in the independent variables on successful career designation. While the results of the Garza's models yielded important information, it was of particular note that two competitive categories did not perform as expected. The law and aviation categories did not produce statistically significant results from the models. Garza attributed this lack of results to a low number of observations and the high selection rate.

Garza used the information from his regression results to create a tool to predict the probability of getting selected for career designation within a specific competitive category. This is interesting because this tool can be adapted and improved to provide useful information to career counselors, other officers in a mentoring role, and to Marines eligible for promotion themselves. Additionally, this tool could be used in further research or development to provide potentially important information to a board.

E. CENTER FOR NAVAL ANALYSES (2012)

The Marine Corps requested the CNA to conduct an analysis of the FITREP system to determine how the current system is performing in regard to score inflation, bias, and how well it helps boards select the “best and most qualified” officers (Clemens et al., 2012). The study is important because the FITREP itself is the primary information that boards use to capture an officer's performance, quality, and potential. Clemens et al. used officer personnel data from 1999 (when the current FITREP was put into use) to 2011.

The study breaks down the FITREP into its respective components and evaluates each component for score inflation, any potential bias, and value to a board. Concerning the score inflation of fitness reports, Clemens, et al. (2012) show in Figure 6 .”..that

marks are becoming more uniform over time: the standard deviation of FRA [FITREP average]s has fallen for every rank. This increasing uniformity could increase the difficulty of identifying the most qualified officers” (p.12).

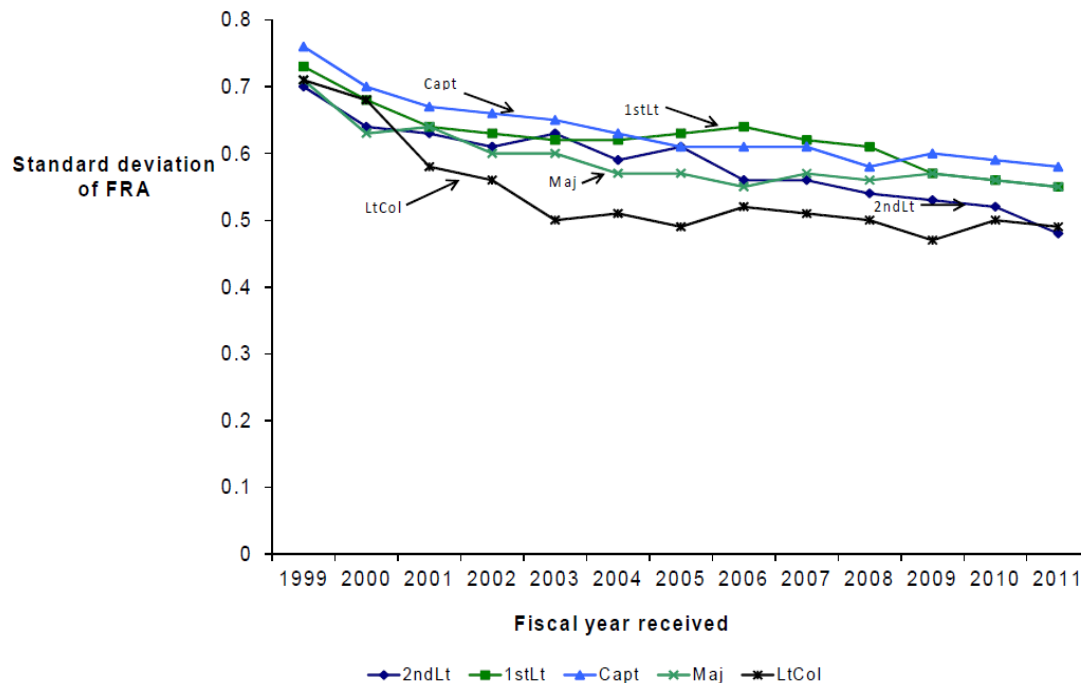


Figure 6. Graph of FITREP Average Standard Deviations by Rank and Year
Source: Clemens et al. (2012)

It is important to understand that the FITREP system is the singular evaluation measurement in the Marine Corps. Stated in the *Performance Evaluation System (PES) Manual* (2015): “The fitness report provides the primary means for evaluating a Marine’s performance to support the Commandant’s efforts to select the best qualified personnel for promotion, career designation, retention, resident schooling, command, and duty assignments” (p.2). Clemens et al.’s finding that the increasing uniformity of FRAs raises concern that the FITREP is not accurately identifying differences in performance in the manner intended.

Clemens et al. then analyzed potential bias within FITREPs. The results found some evidence of bias in certain categories namely by race, gender, and occupational

field (occfield). In particular, they found that officers evaluated by RSs and ROs who are not in the same occfield as the MRO tend to give higher marks to the MRO. Additionally, evidence was found that aviators consistently received lower RS and RO marks than all other MOSs, which supports Reynolds' (2011) hypothesized "aviation effect" (p.1).

Last, Clemens et al. looked at the value of FITREPs to a board. Their overall conclusion was that the current FITREP provides the correct measurement within its scope. However, they make several recommendations for improving the value of FITREPs to the board. A key recommendation was to increase the training for the users of the FITREP system. This would help to alleviate some of the variance in approaches to writing and evaluating FITREPs.

F. SUMMARY

The studies reviewed in this chapter aid in creating data sets and formulating models to analyze promotion to LtCol. The next chapter describes the data gathered and performs an initial analysis of that data. Although the literature reviewed contains certain research that applies to this thesis, it by no means is an exhaustive list of applicable studies (see e.g., Hoffman, 2008; Wiler & Hurndon, 2008; Ergun, 2003).

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IV. DATA AND INITIAL ANALYSIS

A. INTRODUCTION

This chapter describes the datasets used in this thesis, and it defines the dependent (outcome) and independent (explanatory factors) variables used in the multivariate models. The data draws from multiple USMC sources, which were combined to capture an all-around picture of individual officers. The independent variables were chosen based on knowledge regarding the LtCol selection process, the review of the relevant previous literature in Chapter III, as well as data availability.

B. DATA SOURCES

The data was drawn exclusively from Marine Corps data sources. The sample is based on officers who were reviewed by the most recent five years of USMC LtCol promotion boards (2013-2017). The agencies involved in providing data on the sample observations were MMRP, TFDW, and TBS.

1. MMRP

The sample of officers reviewed, as well information on the promotion outcomes (dependent variable) came from MMRP. The binary promotion variable indicates whether an individual selects for promotion to LtCol. This initial sample contains 6,650 observations. Many of the data points represent multiple observations of the same individual, which may arise because they appear in more than one of the three promotion zones as discussed above in Chapter II.

2. TFDW

TFDW provided a substantial number of variables for the final dataset and was instrumental in creating a key for the other data sources to match records to an individual. The variables from TFDW covered demographic, training, education, and experience information. The variables provide the background information allowing for the comparison of officers with the same characteristics.

3. MMRP

The primary explanatory variables came from records provided by MMRP. The FITREP as described in Chapter II is the primary performance measure used for promotion boards. Thus, the key independent variables are taken from the data in the MBS. In particular, the models will consider specific FITREP attributes and the overall relative values included in summary data on the MBS.

4. TBS

The data provided by TBS is also predictive in nature. The success of a Marine's performance at TBS previously has been found to be correlated with career performance (Wiler & Hurndon, 2008, p.89). It remains to be seen, however, whether TBS performance is correlated with promotion at the LtCol level, which is used by this thesis as an indicator of quality in the Marine Corps.

C. DATASETS

This data set in this thesis covers LtCol promotion boards for the period FY2013-FY2017. The data is a "snapshot" of an individual officer's career information in the convening month of the promotion board. The information contains data on demographics, pre-accession metrics, TBS scores, the latest training scores, and an average of an officer's FITREPs over their career. All of this information is viewable by the promotion board members in order to make an informed decision on whom to promote.

D. SAMPLES

The samples begin with an unrestricted sample and have been subsequently restricted to better identify the factors that contribute to successful selection and quality. The initial data set contained $n=6,650$ observations, narrowed down to $n=2,091$ due to the Marine Corps' low selection percentage from Above-Zone and the neutral impact of not being selected from Below-Zone on an officer's career. Thus, the full sample consists of only In-Zone candidates for promotion to LtCol. This sample captures an officer's "first-look" or officers that not previously considered for promotion. Next, the sample is

restricted into separate occupational field categories to compare factors between different MOS groups. The restricted samples contain fewer observations however, they serve to show comparison between MOS categories and potentially identify varying quality traits based on occupation.

E. DEPENDENT VARIABLE

The primary dependent variable is binary and records whether the officer was selected for promotion. Using “selected” as the outcome variable allows the study to identify significant factors that may be associated with successful selection for promotion. These factors can be reasonably linked to factors that may define quality in Marine Corps officers.

F. INDEPENDENT VARIABLES

The independent variables are based on guidance from previous studies and theses to be evaluated in their explanatory power of the dependent variable. They are grouped into several categories in reference to what part of an officer’s selection they attempt to explain. Performance, Training, Experience, Education, MOS, and Demographics comprise the separate categories.

1. Performance

In a service where mission accomplishment is the highest priority, strong career performance is highly valued. The FITREP system attempts to capture quantitatively and qualitatively individual performance for evaluation on boards. The measures on the FITREP are subjective in nature, but guided by standardized criteria. While the FITREP is not the end-all-be-all of the board’s evaluation, it does play a major role in determining who selects for promotion. Commendatory and adverse FITREPs also impact promotion outcomes. In line with commendatory FITREPs awards can conceivably be associated with high performance and need to be assessed for their effects on promotion. These last three measures are objective and should complement the subjectivity of the FITREP scores.

a. FITREP Information

The FITREP data is the primary information used by promotion boards to quantitatively assess an individual officer, as discussed in Chapter II. Four variables are used in this thesis to capture the overall scores on an officer's total FITREPs. These variables are described in Table 2.

The Reporting Senior Relative Value at Processing (RSRV-P), Reporting Senior Relative Value Cumulative (RSRV-C), Reviewing Officer Relative Value at Processing (RORV-P), and Reviewing Officer Relative Value Cumulative (RORV-C) provide insight on how an individual has performed as judged by their superiors. The two sets of values show how the scores relative value changes over time. The “at-processing” value shows the score at the time the FITREP was written and indicates how an officer compares to others of the same rank. The “cumulative” score is how well the value of the FITREP holds up over time, or how much it increases or decreases as the RS or RO writes more FITREPs on the same rank. The RSRVs are numeric scores averaged over all an officer's FITREPs on a 80–100 point scale. The RORVs are calculated differently and reflect how far this officer is above or below the average score for a given RO. For example, a score of +0.50 indicates that an MRO is 0.50 “tree” levels above the RO average for that report. The overall RORVs is based on the average of all of an MRO's FITREPs.

Table 2. Definition of FITREP Scores

Variable	Description	Range
RSRV-P	Average Reporting Senior Relative Value at Processing	80.00 - 99.58
RSRV-C	Average Reporting Senior Relative Value Cumulative	81.71 - 98.60
RORV-P	Average Reviewing Officer Relative Value at Processing	-1.60 - 1.45
RORV-C	Average Reviewing Officer Relative Value Cumulative	-1.40 - 1.21

The next variables derived from FITREP information are the 13 attribute scores used to evaluate an officer on specific areas of performance. Each attribute contains a

description of what is required to achieve a score on a scale of 1–7. The Attribute Relative Value (ARV) is calculated as follows (Reynolds, 2011):

$$\text{ARV} = (\text{MRO Attribute Grade} - \text{RS Average}) + 4.00$$

The MRO grade is “normalized” by adding the average score of 4.00. This allows comparison between MROs with different RSs. The overall ARVs are the average of an officer’s total FITREPs; the same as the RSRV and RORVs. Table 3 shows each attribute description and range of averages.

Table 3. Description of Attribute Scores on Officer FITREPs

Variable	Description	Range
Mission Performance	Average Relative Value of Mission Performance attribute	3.21 - 5.44
Mission Proficiency	Average Relative Value of Mission Proficiency attribute	2.94 - 5.12
Courage	Average Relative Value of Courage attribute	2.74 - 4.50
Effectiveness	Average Relative Value of Effectiveness attribute	2.61 - 4.57
Initiative	Average Relative Value of Initiative attribute	3.02 - 5.28
Leading Subordinates	Average Relative Value of Leading Subordinates attribute	2.92 - 4.79
Developing Subordinates	Average Relative Value of Developing attribute Subordinates	3.03 - 5.00
Setting the Example	Average Relative Value of Setting the Example attribute	2.73 - 5.07
Ensuring Well Being of Subordinates	Average Relative Value of Ensuring Well Being of subordinates attribute	3.22 - 4.81
Communication	Average Relative Value of Communication attribute	2.71 - 4.99
PME	Average Relative Value of PME attribute	2.68 - 4.92
Decision Making	Average Relative Value of Decision Making attribute	3.09 - 4.74
Judgment	Average Relative Value of Judgment attribute	3.14 - 4.74

The last three performance variables are objective measures of the number of personal awards, the number of commendatory FITREPs, and the number of adverse FITREPs. Personal awards include any award given to an individual from the Navy and Marine Corps Achievement Medal to the Medal of Honor and includes awards from any prior service. A FITREP is considered commendatory for any accolade given to an individual

such as a Letter of Appreciation or a medal. Adverse FITREPs are uncommon for officers reaching a LtCol promotion board, but they do exist. FITREPs are considered adverse for any number of reasons regulated in the PES manual Chapter 5. Officers are typically marked adverse for failures in performance or conduct. Poor performance must be well documented and trends identified, to show the MRO has been given time to correct a noted deficiency. Conduct adversity stems from behavior in which the MRO is subject to an adjudicated punitive process or derogatory administrative material (HQMC, 2015, p.5-1). Adverse FITREPs are not taken lightly and not given out without due consideration. Table 4 shows the range and description of the three officer performance variables.

Table 4. Definition of Officer Performance Variables

Variable	Description	Range
Commendatory FITREP	Number of Commendatory FITREPs	0 - 15
Adverse FITREP	Number of Adverse FITREPs	0- 4
Awards	Number of Personal Awards	1- 23

2. Training

The training category variables are metrics taken from officers' training scores. These scores include TBS ranking and TBS aptitude test. Additionally, physical fitness scores and marksmanship scores are included in this category. Training variables also are utilized to control for officer performance in training events required annually for all Marines.

a. *Physical Fitness Scores*

The Marine Corps tests all Marines semi-annually in physical fitness. In the spring the Physical Fitness Test (PFT) is administered and is scored out of 300. The Combat Fitness Test (CFT) is given in the fall, also out of 300. Until recently the promotion board was only privy to an officer's most current fitness scores prior to the board and so these variables only contain scores that the board would see. Table 5 shows the range for promotion eligible officers on the PFT and CFT.

Table 5. Definition of Physical Fitness Scores

Variable	Description	Range
PFT	Most recent PFT Score	0 - 300
CFT	Most recent CFT Score	0 - 300

b. Rifle and Pistol Marksmanship

Marine officers are required to qualify on both rifle and pistol annually unless waived dependent upon their command or until they promote to Major at which point only pistol qualification is required (HQMC, 2007, 2–2). The scores for rifle are out of 350 with 250 being the minimum required to qualify, but there are different classifications of qualification. The levels from highest to lowest for rifle marksmanship are Expert (305-350), Sharpshooter (280-304), Marksman (250-279), and Unqualified (0-249) (HQMC, 2007, p.1-3). For pistol qualifications the minimum scores change to Expert (345), Sharpshooter (305), and Marksman (245) (HQMC, 2007, p.2-3). The variables used in this thesis are binary for each classification, to determine if having a higher qualification affects promotion to LtCol. In Table 6 the description and range for these variables is delineated.

Table 6. Definition of Pistol and Rifle Qualifications Variables

Variable	Description	Range
Pistol Expert	Current Pistol Expert 1=Yes, 0=otherwise	0 - 1
Pistol Sharpshooter	Current Pistol Sharpshooter 1=Yes, 0=otherwise	0 - 1
Pistol Marksman	Current Pistol Marksman 1=Yes, 0=otherwise	0 - 1
Pistol Unqualified	Current Unqualified in Pistol 1=Yes, 0=otherwise	0 - 1
Rifle Expert	Current Rifle Expert 1=Yes, 0=otherwise	0 - 1
Rifle Sharpshooter	Current Rifle Sharpshooter 1=Yes, 0=otherwise	0 - 1
Rifle Marksman	Current Rifle Marksman 1=Yes, 0=otherwise	0 - 1
Rifle Unqualified	Current Unqualified in Rifle 1=Yes, 0=otherwise	0 - 1

3. Experience

An essential predictor of success is in the experience an individual has attained. Experience is hard to measure due to the subjective nature of how, what, when, and where it was obtained. An infantry officer deployed to Afghanistan has had a different set of experienced when compared to another infantry officer deployed to Iraq; even more so when comparing infantry and aviation officers. Holding experience variables constant will allow for better comparison among officers eligible for promotion. Promotion boards presumably do not put emphasis more to one or another deployment with the exception of combat versus non-combat due to General Conway's direction to "get every Marine to the fight." This thesis analyzes combat deployments against non-combat deployments. Another factor to control for among officers is prior enlisted time. Not all officers share the same prior enlisted experience. Other experience variables include specific duty assignments as some may have more weight than other assignments.

a. Combat Deployments

Commandant of the Marine Corps General Conway released an All Marine Message (ALMAR) directing: "Review current personnel assignment policies to ensure maximum assignment flexibility with an orientation towards getting all marines to the fight" (CMC, 2007). His plan was to get every Marine to a combat deployment. Almost ten years later the majority of Marines should have at least one combat deployment. The total number of combat deployments is used to identify part of an officer's experience level. This variable includes deployments that may have occurred during prior enlisted service.

b. Duty Assignments

The duty assignment variables capture combat duty and joint duty as pulled from FITREPs. The combat duty counts the total number of combat FITREPs an MRO has had written on them. This variable acts as a qualifier for the total number of combat deployments. The joint duty variable identifies how many joint duty FITREPs written on an MRO. Joint duty is not required, but is considered essential experience to continue to promote beyond LtCol in the Marine Corps. Table 7 describes the experience variables.

Table 7. Definition of Experience Variables

Variable	Description	Range
Combat Deployments	Total number of Combat Deployments	0 - 11
Combat Duty	Total number of Combat FITREPs	0 - 12
Joint Duty	Total number of Joint Duty FITREPS	0 - 11

4. Education

Education variables are included in the models to analyze the effects of gaining degrees beyond the undergraduate level. Additionally, this thesis looks at the effects of the Marine Corps selectively assigning officers to post-graduate programs or essentially a directed post-graduate degree. Foreign languages are another variable to control for as there are specific billets that require language proficiency and not every officer has the opportunity or desire to pursue those billets.

a. Degree

The next three variables are binary in nature and describe the highest degree achieved by the individual. It is assumed that if an officer has a master's or doctorate that they have the previous degrees as well. The base college variable in TFDW contains reported education levels of high school and Associate's degree. Because a bachelor's degree is required for a Marine Corps commission, the lower education levels were assumed to represent a data coding error and were classified in the Bachelor's degree category.

b. Foreign Language

This variable is for the total number of foreign languages an officer can speak. This is determined by how many test sequences the officer has completed successfully. Table 8 shows the range and description of the education variables.

Table 8. Definition of Education Variables

Variable	Description	Range
Base College	Bachelor's degree is highest education 1=Yes, 0=otherwise	0 - 1
Doctorate	Doctorate is highest education 1=yes, 0=otherwise	0 - 1
Master's	Master's degree is highest education 1= yes, 0=otherwise	0 - 1
Foreign Language	Number of foreign languages spoken	0 - 8

5. MOS

The MOS groups were created by combining similar groups of specific occupational fields. The goal was to examine the effect of sub-cultures within career paths. These occupational groups capture the differences between a set of MOSs that are ground-centric and ones that focus on aviation. The comparison between these groups is essential when analyzing promotion of the “best and most highly qualified” officers. There may be factors that are more significant for one occupational field but are not as important to another. The five MOS groups are: combat arms, aviation, aviation-ground, combat support services, and special, which includes lawyers and acquisition specialists. These groups are defined in Table 9 and represent separate career paths with different training demands and focuses.

Table 9. Definition of MOS Occupational Fields

Variable	Description	Range
Aviation	Aviation MOS: 7509, 7518, 7523, 7525, 7532, 7543, 7556, 7557, 7562, 7563, 7564, 7565, 7566, 7588	0 - 1
Aviation-Ground	Aviation Ground MOS: 7315, 7202, 6602, 6002	0 - 1
Combat Arms	Combat Arms MOS: 0302, 0802, 1802, 1803, 0370	0 - 1
Combat Service Support	Combat Service Support MOS: 0102, 0180, 0202, 0203, 0204, 0207, 0402, 0602, 1302, 3002, 3404, 4302, 5507, 5803	0 - 1
Special	Special MOS: 4402, 8059, 8061	0 - 1

6. Demographics

A key predictor of success for Marine officers is their Leadership rank in TBS. Wiler and Hurndon (2008) found that “the leadership ranking is the best predictor of

future performance, among the three areas of evaluation” (p.93). Officers are ranked based on score in three categories over the course of instruction and then given an overall rank calculate from those categories. These categories are Military Skills, Academics, and Leadership. Unfortunately, there are too many missing values if one were to include all three variables. Instead, the final overall TBS class rank is used to capture the effects of the three categories. This final rank is broken up into thirds to break out officer performance, and represent the tier system used at TBS. The General Classification Test (GCT), administered during TBS, measures an individual’s aptitude at the beginning of TBS. According to Cancian and Klein (2015), “the GCT was found to be highly predictive of success at The Basic School” (p.5). Under Cancian and Klein’s statement, it can reasonably be assumed that a high GCT score could be associated with higher performance and possibly with officer quality. The range and description of variables are in Table 10.

Table 10. Definition of TBS Variables

Variable	Description	Range
GCT	General Classification Test score	90 - 157
Top-third TBS	TBS Overall Rank 1–96	0 - 1
Mid-third TBS	TBS Overall Rank 97–192	0 - 1
Bottom-third TBS	TBS Overall Rank 192–289	0 - 1

The demographic variables in the models control for various backgrounds of the officers. They are binary, for the most part, with the exception of age and number of dependents. It is assumed that the Marine Corps is exercising unbiased judgment in promoting officers, therefore these variables are not intended to analyze the samples for differences among various races, marital statuses, or genders. However, there may be differences associated with race/ethnicity data, such as family background, English language skills, or exposure to the armed services, which are not captured in the models. Table 11 shows the description of the variables.

Table 11. Definition of Demographic Variables.

Variable	Description	Range
Married	Married 1=Yes, 0=otherwise	0 - 1
Dependents	Number of Dependents	0 - 12
Female	Female 1=Yes, 0=otherwise	0 - 1
Non-White	Non-White 1=Yes, 0=otherwise	0 - 1
USNA	Naval Academy Graduates 1=Yes, 0=otherwise	0 - 1
ROTC	Reserve Officer Training Course Graduates 1=Yes, 0=otherwise	0 - 1
OCS	Officer Candidate School Graduates 1=Yes, 0=otherwise	0 - 1
PLC	Platoon Leaders Course Graduates 1=Yes, 0=otherwise	0 - 1
MECEP	Enlisted Education Program Graduates 1=Yes, 0=otherwise	0 - 1
Other Commission Source	Lateral transfers 1=Yes, 0=otherwise	0 - 1
Age	Age	38 - 52

7. Boards

There are five years of promotion boards contained within the sample. Each board is comprised of different members from different backgrounds and experience to ensure fair and unbiased judgment. This creates a great amount of variance from board to board. In order to control for this disparity dummy variables are created to represent the effects of each board.

G. DESCRIPTIVE STATISTICS

The statistics described in this section highlight the means and standard deviations of the variables in the full sample, unless otherwise noted. The purpose of providing summary statistics is to give a baseline for further comparison. In the following tables, differences are noted between the “promoted” and “not-promoted” groups. This comparison could potentially provide evidence as to whether or not the Marine Corps is promoting the “best and most fully qualified” officers.

1. Dependent Variable Summary Statistics

Table 12 shows the promotion rates by MOS group. The table compares selection rates across MOS categories and compares each to the overall selection rate for the entire

sample. The table shows that two MOS groups, Aviation and Aviation-Ground, fall below the average for selection rate to LtCol. From the Secretary of the Navy, promotion opportunity for LtCol will be 70% +/- 10% each year (SECNAV, 2006, p.10). This is evident in the average of 64% selection rate over the five years of promotion boards. It is interesting to note that the selection rate differs for the various MOS groups and is highest among the combat arms and special MOSs.

Table 12. LtCol Selection Rates by MOS Group

Variable	Obs	Mean	Std. Dev.	Min	Max
Full Sample					
selected	2091	0.642	0.479	0	1
Aviation Sample					
selected	628	0.624	0.484	0	1
Combat Arms Sample					
selected	423	0.702	0.457	0	1
Combat Service Support Sample					
selected	767	0.625	0.484	0	1
Aviation Ground Sample					
selected	155	0.580	0.495	0	1
Special MOS Sample					
selected	116	0.715	0.453	0	1

Even though aviation officers make up approximately 30% of the sample, they have a much lower selection rate than combat arms officers. Additionally, aviation-ground officers experience the lowest selection rate of any of the MOS groups. The lower selection rates for the two aviation categories may be due to lack of billet availability at higher echelons.

2. Performance

Tables 13 and 14 compare fitness report scores for the full sample, and separately for a sample of those selected to LtCol. *T*-tests (discussed in the Initial Analysis section

of this chapter) were conducted for these variables to identify significant differences between those promoted and those who failed to promote.

Table 13. Summary Statistics FITREP Scores: Full Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Full Sample					
RSRV-P	2091	92.382	2.882	81.99	99.58
RSRV-C	2091	90.713	2.596	81.74	98.6
RORV-P	2091	0.207	0.404	-1.310	1.445
RORV-C	2091	0.050	0.373	-1.379	1.212
Mission Performance	2091	4.473	0.298	3.268	5.437
Mission Proficiency	2091	4.204	0.267	3.050	5.098
Courage	2091	3.813	0.194	2.986	4.498
Effectiveness	2091	3.897	0.206	3.081	4.572
Initiative	2091	4.292	0.302	3.08	5.283
Leading Subordinates	2091	4.026	0.230	3.095	4.794
Developing Subordinates	2091	3.881	0.214	3.036	5.001
Setting the Example	2091	4.115	0.265	2.973	5.067
Ensuring Well Being of Subordinates	2091	3.960	0.179	3.271	4.801
Communication	2091	4.029	0.261	2.708	4.993
PME	2091	3.590	0.263	2.812	4.917
Decision Making	2091	4.036	0.209	3.205	4.744
Judgment	2091	4.037	0.209	3.136	4.744
Commendatory FITREP	2091	5.053	2.275	0	15
Adverse FITREP	2091	0.048	0.250	0	3
Awards	2091	5.573	2.185	0	23

Table 14. Summary Statistics of FITREP Scores: Sample Composed of those Selected to LtCol

Variable	Obs	Mean	Std. Dev.	Min	Max
Selection-restricted					
RSRV-P	1343	93.523	2.267	86.39	99.58
RSRV-C	1343	91.757	2.099	85.13	98.6
RORV-P	1343	0.367	0.324	-0.573	1.445
RORV-C	1343	0.198	0.302	-0.755	1.212
Mission Performance	1343	4.586	0.243	3.837	5.437
Mission Proficiency	1343	4.294	0.229	3.387	5.098
Courage	1343	3.855	0.188	3.15	4.498
Effectiveness	1343	3.956	0.189	3.295	4.572
Initiative	1343	4.393	0.256	3.5	5.283
Leading Subordinates	1343	4.096	0.206	3.465	4.794
Developing Subordinates	1343	3.941	0.197	3.396	5.001
Setting the Example	1343	4.197	0.234	3.315	5.067
Ensuring Well Being of Subordinates	1343	3.993	0.174	3.46	4.801
Communication	1343	4.095	0.236	3.291	4.993
PME	1343	3.618	0.261	2.934	4.785
Decision Making	1343	4.102	0.179	3.516	4.744
Judgment	1343	4.103	0.178	3.53	4.744
Commendatory FITREP	1343	5.443	2.269	0	15
Adverse FITREP	1343	0.008	0.101	0	2
Awards	1343	5.985	2.128	1	23

These statistics are useful for comparing the primary FITREP measures. While the full sample means do fall within the range of the variables for promoted officers, the scores tend to be higher for the promoted officers. What is unexpected is the evidence that there are any adverse FITREPs among those promoted, 4% compared to 0.8% for the full sample. In addition, the range includes one or more individuals selected for promotion with two adverse FITREPs on their records. This is surprising considering the highly negative stance the Marine Corps takes on adverse FITREPs. Further comparison of summary statistics per MOS group is available in Appendix A.

3. Training

Table 15 presents summary statistics for the training variables for the full sample. A high percentage of officers are rifle and pistol experts relative to sharpshooter and marksman. One piece of information missing to qualify the level of marksmanship is the currency of the officer's reported qualification. Majors are not required to shoot rifle and can hold billets that waive the annual pistol requalification requirement, such as in a training command. While the marksmanship level is a primary indicator of training performance it would benefit by identifying currency as well.

Table 15. Summary Statistics of Training Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Full Sample					
PFT	2091	243.610	65.796	0	300
CFT	2091	275.625	62.697	0	300
Pistol Expert	2091	0.534	0.499	0	1
Pistol Sharpshooter	2091	0.346	0.476	0	1
Pistol Marksman	2091	0.117	0.322	0	1
Pistol Unqualified	2091	0.001	0.031	0	1
Rifle Expert	2091	0.544	0.498	0	1
Rifle Sharpshooter	2091	0.216	0.411	0	1
Rifle Marksman	2091	0.236	0.425	0	1
Rifle Unqualified	2091	0.003	0.058	0	1

4. Experience

The experience variables are defined in Table 16. These factors are significant in determining successful promotion. The number of combat deployments, combat FITREPS, joint-duty FITREPS, and years of service are all used as measures of an officer's experience. Controlling for experience eliminates the varying levels throughout MOS and units. An average of 2.78 combat deployments supplemented by 3.2 combat FITREPs on average is expected considering the operational tempo maintained over the past decade. Joint duty FITREPs is surprising considering the emphasis on joint duty assignments prior to reaching Colonel.

Table 16. Summary Statistics for Experience Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Full Sample					
Combat Deployments	2091	2.781	1.396	0	10
Combat Duty	2091	3.205	1.987	0	12
Joint Duty	2091	0.595	1.327	0	10

5. MOS

The MOS categories show the percentage breakdown in the sample. In Table 17 combat service support MOSs have the most officers eligible for promotion in the sample (36%). This category contains any MOS that is not designated as combat, aviation, aviation-ground, or special (acquisition or lawyer).

Table 17. Summary Statistics for MOS Groups

Variable	Obs	Mean	Std. Dev.	Min	Max
Full Sample					
Aviation	2091	0.300	0.459	0	1
Aviation-Ground	2091	0.074	0.262	0	1
Combat Arms	2091	0.202	0.402	0	1
Combat Service Support	2091	0.367	0.482	0	1
Special	2091	0.055	0.229	0	1

6. Education

Table 18 shows means of the education variables. The base college variable is slightly misleading stating that 54% of the sample has a bachelor's degree. This represents officers who have a B.A. as their highest level of education achieved. An interesting statistic is the percentage of officers in the sample with a master's degree (37%). This most likely indicates that officers are actively seeking to raise their education levels on their own time or through programs offered by the military, which in turn could represent either a desire to increase job opportunity outside the Marine Corps or to increase their chances of promotion selection.

Table 18. Summary Statistics of Education Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Full Sample					
Base College	2091	0.597	0.491	0	1
Doctorate	2091	0.014	0.119	0	1
Master's	2091	0.376	0.485	0	1
Foreign Language	2091	0.311	0.737	0	8

7. Demographics

Potential demographic biases are expressly addressed in a promotion board precept to keep the board members focused on performance vice any perceived quotas based on demographic background. The Marine Corps does a fairly good job of maintaining focus on selecting the “best and most fully qualified” officers for promotion. Nonetheless, it is important to control for demographic background in the multivariate models as differences in performance may still be related to demographic background. The TBS variables show that 43% of the sample comes from officers ranked in the top-third of their TBS companies. This statistic may indicate that the Marine Corps may be retaining higher performing individuals or that individuals in the top-third of their TBS class may be more likely to stay in the Marine Corps for 15–17 years.. An interesting statistic in Table 19 is that 95% of the eligible officers are male. On the outset this may seem a distinct bias toward male officers but consideration must be given to how many females are actually in the Marine Corps at a given time. Additionally, the table shows the number of officers from the various accession programs. Interestingly, the majority of officers come from Officer Candidates School (OCS), which occurs after the completion of a bachelor's degree. Whereas, accession programs that coincide with college attendance are evenly distributed. The average age of officers eligible for promotion to LtCol is 42. Working backwards, the Marine Corps aims for officers to reach the LtCol board at year 15 of commissioned service; that would mean most officers commissioned when they were around 27, which is approximately 4–5 years after an average college student graduates. This could indicate a significant amount of prior enlisted service in the

sample or that officers began their careers elsewhere and opted to enter the military later. This would coincide with the high percentage of OCS accessions.

Table 19. Summary Statistics of Demographic Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Full Sample					
GCT	2056	124.916	9.672	90	157
Top-third TBS	2091	0.436	0.496	0	1
Mid-third TBS	2091	0.399	0.490	0	1
Bottom-third TBS	2091	0.165	0.371	0	1
Married	2091	0.876	0.330	0	1
Unmarried	2091	0.124	0.330	0	1
Dependents	2091	2.662	1.549	0	12
Male	2091	0.947	0.224	0	1
Female	2091	0.053	0.224	0	1
White	2091	0.775	0.418	0	1
Non-White	2091	0.225	0.418	0	1
USNA	2091	0.105	0.307	0	1
ROTC	2091	0.115	0.319	0	1
OCS	2091	0.319	0.466	0	1
PLC	2091	0.280	0.449	0	1
MCP	2091	0.163	0.370	0	1
Other Commission Program	2091	0.018	0.132	0	1
Age	2091	42.160	2.606	38	52

H. INITIAL ANALYSIS

The descriptive statistics section identified various areas that warrant further investigation. In particular, differences in Selection Rates and Performance measures are two areas that are the focus of this section.

1. Selection Rates

The selection rate from the summary statistics is 64% for all officers over the past five years of promotion boards. This is in line with the mandated rates. However, are selection rates significantly different across different MOS categories? An independent

mean-comparison test, or *t*-test, is required to identify if the means of selection rates are statistically significantly different across MOS groups. In this sample each MOS category is compared against the mean of all other MOS categories. Table 20 shows the *t*-tests for selection rates across MOS groups. Table 21 shows that selection rates for combat arms, aviation-ground, and special MOS groups are all significantly different from the average of all other MOSs.

Table 20. *T*-tests of Selection by MOS Category

T-Test	Mean		
Variable	Aviation	Other MOS	P-value
Selected	0.624	0.650	0.258
n=	628	1463	
Variable	Combat Arms	Other MOS	P-value
Selected	0.702	0.627	0.004
n=	423	1668	
Variable	Combat Service Support	Other MOS	P-value
Selected	0.625	0.651	0.232
n=	767	1324	
Variable	Aviation-Ground	Other MOS	P-value
Selected	0.580	0.647	0.096
n=	155	1936	
Variable	Special	Other MOS	P-value
Selected	0.715	0.637	0.090
n=	116	1975	

Combat service support selection rates are significantly lower than all other MOSs. On the other hand, selection rates for combat arms and special MOS categories are statistically higher than for all other MOS categories. This pattern could be due, in part, to limited availability of billets for a particular MOS at the LtCol level or higher. An alternative hypothesis could be that officer characteristics valued by different MOS groups do not necessarily coincide with the overall Marine Corps values. Further analysis would be necessary to explore the sources of MOS-related differences in selection rates.

Figure 7 shows the selection rate trends over the five boards for each MOS category compared to the overall selection rate each year. Trend-lines in selection rates are plotted to show the trend for each MOS group. Additionally, the orange plot line represents the average selection rate for all MOS groups. In keeping with the *t*-tests the three MOS groups that were significantly different from the mean show the largest difference in selection rates from the All_mos category. All categories exhibit negative trends in selection rate, but only combat arms has a trend less negative than that of the overall selection rate.

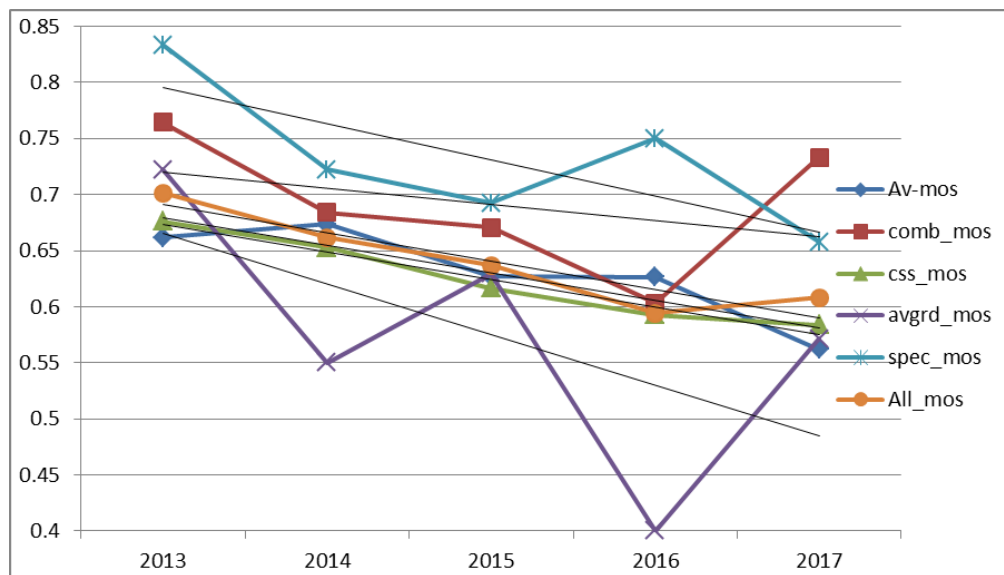


Figure 7. Selection Rates by MOS Category over Time

2. Performance Differences

To better understand the differences in selection rates by MOS, this section presents *t*-tests of differences in the means of various performance measures by MOS group. Tables 21–25 show the *t*-test results by MOS group. Red highlights indicate a significant negative difference for a given performance measure in a given MOS compared to the average value of that performance indicator. Green highlights significant positive differences between a given MOS and the group mean for that performance measure.

The combat arms category has the majority of significantly higher values of the performance variables means. These differences could indicate a difference in how the

FITREP attribute scores are assigned by MOS category. In other words, some MOS groups may value a particular attribute over another. Another explanation could be that the RSs of a given MOS may assign higher marks than others, due to cultural norms. The aviation and combat service support categories results demonstrate the most negative differences when compared against the average of the other MOS groups. Many of the MOSs in these categories involve larger pools of officers, which might drive the average for the category lower. These results are concerning since the Marine Corps seeks to promote only those of the highest quality, which raises the question of what exactly are the qualities that the Marine Corps values.

Table 21. *T*-test of Performance Variables for Aviation MOS

T-Test	Mean		
Variable	Aviation	Other MOS	P-value
RSRV-P	91.960	92.560	0.000
RSRV-C	90.470	90.810	0.005
RORV-P	0.189	0.215	0.183
RORV-C	0.009	0.068	0.000
Mission Performance	4.500	4.450	0.000
Mission Proficiency	4.240	4.180	0.000
Courage	3.800	3.810	0.300
Effectiveness	3.890	3.890	0.694
Initiative	4.270	4.300	0.072
Leading Subordinates	3.950	4.050	0.000
Developing Subordinates	3.850	3.890	0.002
Setting the Example	4.055	4.140	0.000
Ensuring Well Being of Subordinates	3.900	3.980	0.000
Communication	4.000	4.030	0.009
PME	3.530	3.610	0.000
Decision Making	4.040	4.030	0.151
Judgment	4.030	4.030	0.865
Commendatory FITREP	4.740	5.180	0.000
Adverse FITREP	0.036	0.053	0.145
Awards	6.230	5.290	0.000
n=2091	628	1463	

Table 22. *T*-test of Performance Variables for Combat arms MOS

T-Test	Mean		
Variable	Combat Arms	Other MOS	P-value
RSRV-P	92.910	92.240	0.000
RSRV-C	91.190	90.590	0.000
RORV-P	0.288	0.186	0.000
RORV-C	0.140	0.027	0.000
Mission Performance	4.490	4.460	0.168
Mission Proficiency	4.230	4.190	0.004
Courage	3.860	3.800	0.000
Effectiveness	3.950	3.880	0.000
Initiative	4.330	4.280	0.004
Leading Subordinates	4.120	4.000	0.000
Developing Subordinates	3.950	3.860	0.000
Setting the Example	4.160	4.100	0.000
Ensuring Well Being of Subordinates	4.000	3.940	0.000
Communication	3.990	4.030	0.000
PME	3.630	3.570	0.000
Decision Making	4.070	4.020	0.000
Judgment	4.060	4.030	0.005
Commendatory FITREP	5.100	5.040	0.609
Adverse FITREP	0.059	0.046	0.342
Awards	5.950	5.470	0.000
n=2091	423	1668	

Table 23. *T*-test of Performance Variables for Combat Service Support MOS

T-Test	Mean		
Variable	Combat Service Support	Other MOS	P-value
RSRV-P	92.344	92.404	0.647
RSRV-C	90.637	90.758	0.303
RORV-P	0.180	0.223	0.019
RORV-C	0.033	0.060	0.114
Mission Performance	4.444	4.490	0.000
Mission Proficiency	4.169	4.225	0.000
Courage	3.794	3.825	0.000
Effectiveness	3.874	3.911	0.000
Initiative	4.284	4.297	0.342

T-Test	Mean		
Variable	Combat Service Support	Other MOS	P-value
Leading Subordinates	4.036	4.021	0.126
Developing Subordinates	3.865	3.891	0.007
Setting the Example	4.136	4.103	0.006
Ensuring Well Being of Subordinates	3.979	3.950	0.000
Communication	4.037	4.025	0.290
PME	3.611	3.578	0.005
Decision Making	4.009	4.052	0.000
Judgment	4.018	4.048	0.001
Commendatory FITREP	5.185	4.977	0.044
Adverse FITREP	0.055	0.045	0.406
Awards	5.057	5.872	0.000
n=2091	767	1324	

Table 24. *T*-test of Performance Variables for Aviation-Ground MOS

T-Test	Mean		
Variable	Aviation-Ground	Other MOS	P-value
RSRV-P	92.560	92.360	0.404
RSRV-C	90.600	92.720	0.604
RORV-P	0.167	0.210	0.207
RORV-C	0.020	0.052	0.304
Mission Performance	4.450	4.470	0.395
Mission Proficiency	4.150	4.200	0.012
Courage	3.770	3.810	0.007
Effectiveness	3.860	3.900	0.041
Initiative	4.300	4.290	0.705
Leading Subordinates	4.040	4.020	0.376
Developing Subordinates	3.880	3.880	0.684
Setting the Example	4.120	4.110	0.810
Ensuring Well Being of Subordinates	3.980	3.950	0.064
Communication	4.020	4.020	0.945
PME	3.580	3.590	0.878
Decision Making	4.010	4.030	0.286
Judgment	4.010	4.030	0.227
Commendatory FITREP	5.320	5.030	0.126
Adverse FITREP	0.064	0.047	0.416
Awards	4.930	5.620	0.000

T-Test	Mean		
Variable	Aviation-Ground	Other MOS	P-value
n=2091	155	1936	

Table 25. *T*-test of Performance Variables for Special MOS

T-Test	Mean		
Variable	Special MOS	Other MOS	P-value
RSRV-P	92.650	92.367	0.303
RSRV-C	90.883	90.704	0.470
RORV-P	0.238	0.206	0.408
RORV-C	0.095	0.048	0.184
Mission Performance	4.437	4.475	0.176
Mission Proficiency	4.160	4.207	0.068
Courage	3.833	3.813	0.278
Effectiveness	3.902	3.897	0.817
Initiative	4.293	4.292	0.963
Leading Subordinates	3.955	4.031	0.000
Developing Subordinates	3.830	3.885	0.007
Setting the Example	4.124	4.115	0.717
Ensuring Well Being of Subordinates	3.913	3.963	0.003
Communication	4.220	4.018	0.000
PME	3.593	3.590	0.899
Decision Making	4.026	4.037	0.572
Judgment	4.093	4.034	0.003
Commendatory FITREP	5.293	5.039	0.243
Adverse FITREP	0.009	0.051	0.075
Awards	4.888	5.614	0.000
n=2091	116	1975	

I. SUMMARY

The preliminary analysis of the officer performance and selection data reveals some interesting observations in regards to officer performance characteristics. Finding statistically significant differences in the attribute values assigned across MOS categories shows that although the RSRV scores are comprised of “normed” attribute values there is more to discover in the attributes themselves. It is possible that separate MOS categories

have sub-cultures that influence how performance is graded and thus how quality is measured. What attributes are associated with higher probabilities of selection within each MOS category? The next chapter describes the methods used to analyze the data and results to answer the questions.

V. METHODOLOGY AND RESULTS

A. METHODOLOGY

What factors are most likely to predict selection to LtCol? To be able to address this question, a multivariate statistical analysis, using regression models, will be used. The descriptive statistics, presented in the previous chapter, show whether average selection rates vary by different criteria, such as MOS; it provides useful information in discovering what areas warrant further analysis. Multivariate regression analysis is a way of analyzing the data to estimate the effects of a given variable or variables (x_i) on a given variable (y), while holding constant the effect of other important predictors. The preliminary analysis in Chapter IV provides insight into measurable factors that may be linked to officer quality.

1. Theoretical Model

Probit multivariate regression is an estimating technique to estimate how changes in a given predictor variable, x , affects the probability of an outcome, y . In particular, how do measures of officer characteristics, such as performance, MOS, training, education, experience, and demographic characteristics, relate to the probability of being selected for LtCol? Linear Probability Model, logit, and probit models are all candidate techniques for analysis when the dependent variable is binary. Wooldridge (2009) states: “the Probit model is based on the normal distribution of the cumulative distribution function (CDF), which coupled with the binary response dependent variable, provides the maximum likelihood estimation (MLE) dependent upon the distribution of y given x ” (Wooldridge, 2009, p. 578). This roughly translates to the probability of being selected to LtCol given that an officer has certain characteristics. The probit estimation technique is used to estimate the multivariate models in this thesis. Figure 8 shows the theoretical probit model where the symbol y is the dependent, or “explained,” variable of Selected. The x symbol represents the independent, or “explanatory,” variables. The coefficient symbol, β , in the equation is the vector of the coefficients of the independent variables.

<p>Binary Response Probit Model:</p> $P(y = 1 x) = G(\beta_0 + \beta_x)$ <p>Function of the Probit Model, the Normal CDF:</p> $G(z) = \theta(z)$
--

Figure 8. Probit Model. Source: Wooldridge (2009)

2. Econometric Model

The full model used in this thesis models LtCol selection as a function of five groups of variables representing various aspects of an officer's profile. On promotion boards, FITREP score summary statistics are provided to quantify officer performance characteristics. Promotion board members are familiar with FITREPs and can interpret the statistics in an officer's brief sheet. FITREP scores are used in the full econometric model in Figure 9 from which six different model specifications are used.

<p>Full Model: $P(\text{promotion selection}) = G(\beta_0 + \beta_{\text{performance}} + \beta_{\text{training}}$</p> $+ \beta_{\text{experience}} + \beta_{\text{education}} + \beta_{\text{demographics}} + \beta_{\text{FYboard}})$
--

Figure 9. Econometric Model

The models attempt to isolate those factors which best explain selection to LtCol. Further analysis investigates whether or not the predictive strength of the various factors vary across different MOS categories. The results of the models will provide evidence on what factors might be associated with officer quality.

3. Specific Models

In previous research, RSRV and RORV scores were found to be statistically significant in predicting selection for both promotion (Reynolds, 2011) and career designation (Garza, 2014). This thesis will explore the RSRV and RORV scores, one measured at processing and the other based on cumulative scores. The baseline models includes only these four FITREP scores and excludes all other factors.

Six different models are specified and estimated. The first three models analyze the effects of FITREP scores (RSRV and RORV) on the promotion outcome, and how those effects change when new explanatory measures are added to the model. The next three models break down the RS score from the FITREP into the component attribute scores. Three additional models are also specified that add explanatory variables to the attribute score models.

Finally, this thesis estimates Model 6 for separate MOS categories to analyze if the effects of attribute scores vary by MOS group. The models are displayed in Figure 10. The results of the models help in answering the primary and secondary questions posed in this thesis.

<p>Model 1: $P(\text{promotion selection}) = G(\beta_0 + \beta_{\text{performance}}(\text{RSRV}, \text{RORV}) + \beta_{\text{FYboard}})$</p> <p>Model 2: $P(\text{promotion selection}) = G(\beta_0 + \beta_{\text{performance}}(\text{RSRV}, \text{RORV}) + \beta_{\text{training}} + \beta_{\text{experience}} + \beta_{\text{FYboard}})$</p> <p>Model 3: $P(\text{promotion selection}) = G(\beta_0 + \beta_{\text{performance}}(\text{RSRV}, \text{RORV}) + \beta_{\text{training}} + \beta_{\text{experience}} + \beta_{\text{education}} + \beta_{\text{demographics}} + \beta_{\text{FYboard}})$</p> <p>Model 4: $P(\text{promotion selection}) = G(\beta_0 + \beta_{\text{performance}}(\text{Attributes}) + \beta_{\text{FYboard}})$</p> <p>Model 5: $P(\text{promotion selection}) = G(\beta_0 + \beta_{\text{performance}}(\text{Attributes}) + \beta_{\text{training}} + \beta_{\text{experience}} + \beta_{\text{FYboard}})$</p> <p>Model 6: $P(\text{promotion selection}) = G(\beta_0 + \beta_{\text{performance}}(\text{Attributes}) + \beta_{\text{training}} + \beta_{\text{experience}} + \beta_{\text{education}} + \beta_{\text{demographics}} + \beta_{\text{FYboard}})$</p>
--

Figure 10. Model Specifications for Full Sample

B. RESULTS

The marginal effects of the explanatory variables from probit models are presented in Tables 26–28. For continuous variables, such as age, the estimated coefficients (marginal effects) are interpreted as the effect of a one-unit increase in the explanatory variable on the probability of promotion.

For ease of interpretation and easier comparison across models, the FITREP scores and the attribute variables are standardized to a mean of zero and unit standard deviation. The coefficient of these standardized variables can be interpreted as the effect of an increase of one standard deviation in the FITREP score on the probability of promotion (which is a rate or percentage). For example, an estimated coefficient of RSRV-P of .107 would indicate that a one-standard deviation increase in the RSRV score increases the selection probability by 10.7 percentage points. In turn, the percentage effect can be obtained by dividing the percentage point effect (i.e., the marginal effect) by the overall sample promotion probability. In this example, the 10.7 point marginal effect for RSRV-P represents a difference of 17.8% ($=10.7 / 60.0 = 17.8\%$).

It is important to mention in the interpretation of the coefficients that all other variables are held constant. The statistical significance level of an estimated coefficient is shown by asterisks next to the coefficients. The level of significance is indicated by one, two, or three asterisks with three asterisks indicating the highest (.01) level.

There are several binary (or dummy) variables that characterize officers in a dichotomous manner, such as being a rifle expert or sharpshooter (=1) or not (=0). The coefficient estimates compare the effect of being in a particular state (e.g., expert or sharpshooter) as compared against reference categories. The coefficients of the dummy variables estimated in this thesis are compared to a Marine officer in the reference categories listed below:

- White, male, unmarried, and commissioned via USNA;
- Pistol and Rifle Marksman/Unqualified, TBS Bottom-third;
- Baccalaureate degree is the highest education attained, not funded for further education;

Dummy variables representing each FY Board are included in each model, but are not reported in the results.

The FITREP RS scores and attribute scores used in the models tend to be highly correlated. Appendix D shows a simple correlation matrix for the FITREP and attribute scores. The University of California Los Angeles (UCLA) provides guidance on the topic

of multicollinearity. They state on their website, “The primary concern is that as the degree of multicollinearity increases, the regression model estimates of the coefficients become unstable and the standard errors for the coefficients can get wildly inflated” (UCLA, 2017). For the FITREP variables in the promotion models multicollinearity can present a potential problem. This thesis tested the degree of multicollinearity using a variable inflation factor (VIF). The threshold associated with VIF is a factor of 10.0, with VIF values of 10 or higher for a given explanatory variable suggesting problems in the model. Kutner, Nachtsheim, Neter, and Li (2005) state that “a maximum *VIF* value in excess of 10 is frequently taken as an indication that multicollinearity may be unduly influencing the least squares estimates” (p.409). For the FITREP scores, two variables demonstrated a VIF over 10, RORV-P and RORV-C, which is not surprising as the simple correlation between the two is .96.

To examine the effect of multicollinearity, the model was estimated after removing RORV-C from the model. RORV-C was chosen for removal because it had the highest VIF value in the initial test. Re-estimating the model without RORV-C resulted in the VIF values for the other variables falling well below the threshold. The process was repeated for the attribute scores, but no VIFs exceeded the 10.0 threshold, so no other variables were omitted from the model.

1. Base Model with FITREP Scores

Model (1) of Table 26 includes performance measures (RSRV-P, RSRV-C, RORV-P) to examine the direct relationship between summary fitness report scores and promotion. The augmented Models (2) and (3) seek to determine if including additional variables in the model changes the coefficients of the FITREP scores. In Model (2) measures of career performance, training, and experience are included in the model; in Model (3) demographic variables are added. All of the models include dummy variables for the FY board so that the coefficients reflect the effect of each FITREP score for officers reviewed by a given FY board (rather than the average effect for all five boards).

Table 26 shows the results of these three model specifications. To summarize the main results, the coefficients of the FITREP scores are stable across the three models and

there is little change in the standard errors. This supports the view that the coefficients of the FITREP variables in Model (1) were not capturing the effect of other, more objective, performance indicators. The results suggest that (subjective) FITREP scores and the additional (objective) career variables are potentially measuring different aspects of officers' performance.

a. Model 1 – Summary FITREP Scores

The first model in Table 26 includes only the three FITREP scores. All three coefficients are statistically significant. The coefficients of the RSRV-P and RSRV-C scores indicate that a one-standard deviation increase in each score improves the probability of promotion by 10.6 percentage points (or 16%) and 12.3 percentage points (or 19%), respectively. The RORV-P increases the likelihood of promotion by 17.0 percentage points (or 26%). Based on the size of the coefficients (such as the percent changes in promotion), these effects are quite large and highlight the general importance of FITREP marks on promotion board outcomes.

b. Model 2 – Summary FITREP Scores

Model (2) in Table 26 incorporates several additional measures that capture officers' objective performance: the number of commendatory and adverse FITREPs and the number of awards accumulated over the officer's career. Model (2) also includes annual training measures, including marksmanship levels, CFT scores and PFT scores. Finally, three experience variables are included in the second model: the number of combat duty and joint duty FITREPs, and the number of combat deployments.

One reason for adding these career performance and training measures is to determine whether the FITREP scores (in Model (1)) capture the indirect promotion effects of the more objective career background factors (such as number of awards and training scores), or whether the FITREP scores reflect aspects of performance that are not captured by the more objective indicators. Since many of the explanatory variables added to Models (2) and (3) will be positively correlated with the probability of promotion, it is expected that the effects of FITREP scores in Model (1) are biased upward and will fall when objective performance variables are added to Models (2) and (3).

The results show that in Models (2) and (3) the coefficients of all three of the FITREP scores are relatively stable and maintain their significance levels as compared to Model (1). This is important because it suggests that the objective measures of performance (e.g., number of awards or training scores) capture different information on officer performance than that captured by the FITREP scores.

In Model (2), of the additional career performance variables, the number of adverse FITREPs and the number of commendatory FITREPs are both statistically significant. One additional commendatory FITREP increases the promotion rate by 1.3 percentage points. However, one additional adverse FITREP reduces the promotion rate by half (by -51.3 percentage points). The effect of the number of adverse FITREPs is likely to be overstated because an receipt of an adverse FITREP is a very rare event in the data. Table 15 above shows that only about 11 officers (out of 1,343) ever received an adverse FITREP, and it is likely that most, if not all, of these failed to promote. Nonetheless, the negative effect of an adverse FITREP on promotion is expected and reaffirms the seriousness of any adverse material.

Only the PFT score variable in Model (2) is significant among the training variables, with a one-point increase in PFT score increasing the promotion probability by .09 percentage points. The scale of the PFT is 0–300, thus the small effect is not unexpected. Increasing a PFT score by one point will result in very little change in promotion probability; however, an increase of 10 points in the PFT score would result in a .90 percentage point change in promotion. Given the Marine Corps proclivity for physical fitness the magnitude of the coefficient is interesting. In contrast the Marine Corps' other physical fitness measure, CFT score, is insignificant.

Combat deployments in Model (2) is the only experience variable that is significantly associated with promotion to LtCol. While the number of combat deployments in an officer's career is highly significant in predicting promotion, there is only a 3.1 percentage point increase in the promotion probability for each additional combat deployment. This may indicate a desire for the Marine Corps to promote officers with at least a minimum of combat experience.

c. Model 3 – Summary FITREP Scores

Model (3) in Table 26, adds information on advanced education and demographic characteristics to model (2). A variable for number of foreign languages spoken also is included as another proxy for advanced education. The demographic variables capture marital status, gender, race, age, dependents, and commissioning source. They also include GCT score, as well as their TBS tier standing upon TBS graduation as measures of cognitive ability. Previous studies (Wiler & Hurndon, 2008) found high GCT scores and graduation in top third of TBS are associated with better performance in Marine officers. However, in Model (3) all of the cognitive aptitude variables are insignificant.

As in the previous two models, FITREP scores are highly significant in Model (3). A one-standard deviation increase in RSRV-P and RSRV-C increase the promotion rate by 12.0 percentage points and 11.8 percentage points, respectively. The RORV-P coefficient indicates that an increase in this score by one standard deviation increases promotion by 15.7 percentage points.

Compared to Model (2), the number of commendatory FITREPs is insignificant, which implies they may be captured by the three FITREP scores. Alternatively, the effect of the commendatory FITREPs could be indirectly captured in the awards variable due to how the *PES Manual* directs the assignment of a commendatory FITREP. In the training variables CFT is now marginally significant at the .1 level and similar to the PFT increases the promotion probability only slightly with a one-point increase in the score.

In Model (3) of Table 26. combat duty and joint duty FITREPs continue to be statistically insignificant in predicting promotion. This is an interesting result considering the Marine Corps' general goal of officers serving in joint duty assignments and the emphasis put on combat experience; evidenced by the highly significant combat deployments variable. Presumably, the effect of having joint duty FITREPs is indirectly captured in one of the four key performance variables in these models.

Having a master's degree is associated with a 7.2 percentage point increase in the promotion probability compared to an officer with only an undergraduate degree. Speaking one more foreign language increases the promotion rate by 4.02 percentage

points. Having a doctorate degree is insignificant in predicting promotion to LtCol. This may be due to the amount of time required to complete that level of education, which is time spent away from the FMF.

Four demographic variables are statistically significant in this model. Women are more likely to be promoted, by 10.2 points, than are men. Graduating from a NROTC program is statistically insignificant, while PLC and OCS graduates are more likely to be promoted, by about 10 points, as compared to USNA graduates. Age at commissioning is highly significant but is associated with a decrease in probability to promote to LtCol by 2.89 percentage points. This effect is likely to reflect officers with prior enlisted service.

Table 26. Marginal Effects Estimates from Probit Models of Promotion to LtCol

	Model (1)	Model (2)	Model (3)
Performance			
RSRV-P	0.106*** (0.0255)	0.110*** (0.0265)	0.120*** (0.0271)
RSRV-C	0.123*** (0.0277)	0.125*** (0.0289)	0.118*** (0.0299)
RORV-P	0.170*** (0.0195)	0.163*** (0.0205)	0.157*** (0.0211)
Commendatory FITREPs		0.0130** (0.00621)	0.00771 (0.00639)
Adverse FITREPs		-0.513*** (0.0738)	-0.512*** (0.0739)
Awards		0.0115 (0.00714)	0.0158** (0.00747)
Training			
Pistol Expert		0.0424 (0.0401)	0.0220 (0.0419)
Pistol Sharpshooter		0.0560 (0.0399)	0.0441 (0.0417)
Rifle Expert		0.00543 (0.0308)	0.00361 (0.0322)
Rifle Sharpshooter		-0.00717 (0.0364)	-0.0203 (0.0378)
CFT		0.000273 (0.000196)	0.000332* (0.000201)
PFT		0.000971*** (0.000194)	0.000709*** (0.000201)
Experience			
Combat Duty		0.00857 (0.00884)	0.000821 (0.00927)
Joint Duty		0.00988 (0.00973)	0.00959 (0.00997)
Combat Deployments		0.0307** (0.0120)	0.0372*** (0.0126)
Education			
Master's			0.0720*** (0.0262)
Doctorate			0.0633 (0.0915)
Foreign Language			0.0402**

	Model (1)	Model (2)	Model (3)
			(0.0174)
Demographics			
GCT			-0.00161
			(0.00151)
Top-third TBS			0.0639
			(0.0429)
Mid-third TBS			0.0485
			(0.0381)
Non-White			-0.00334
			(0.0385)
Female			0.102**
			(0.0501)
Married			0.0279
			(0.0463)
Dependents			0.00676
			(0.00963)
Age			-0.0289***
			(0.00610)
ROTC			0.0622
			(0.0507)
OCS			0.0998**
			(0.0465)
PLC			0.0922**
			(0.0442)
MCP			-0.0254
			(0.0589)
Other Commission Source			-0.161
			(0.110)
Observations	2,091	2,091	2,056

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

2. Base Model with FITREP Attribute Scores

The results above in Table 26 show that the three FITREP RS and RO variables are significant in predicting promotion. This section explores the within-FY board

promotion effects of the specific 13 attribute values. The purpose behind analyzing the attributes is to determine whether the specific personal performance traits of officers captured by the attributes are linked to promotion outcomes. Attributes that demonstrate significance may aid in creating a standard definition of quality of Marine Corps officers.

In Table 27, three different models are used to estimate the direct effects of the 13 attribute scores. The model specifications are the same as in Table 26, with the exception that the 13 attribute scores are substituted for the three FITREP scores. Models (5) and (6) include the same additional explanatory variables as in Models (2) and (3) in Table 26 above

a. Model 4 – Attribute Scores

There are 13 traits, or attributes, described in Chapter II, evaluated in Marine officers' FITREPs. In the probit model in Model (4) of Table 27, the coefficients of seven of the attribute scores are statistically significant. *Mission Performance* and *Setting the Example* have a positive effect on promotion. A one-standard deviation increase in the *Mission Performance* score increases the probability of promotion by 14.8 percentage points, and a one-standard deviation increase in the *Setting the Example* score is associated with a 10.4 point increase. The sizes of these effects are quite large. The effects of one-standard deviation increase in scores on *Mission Proficiency* and *Leading Subordinates* are smaller; their effect is to increase the promotion probability by only 4.28 and 3.95 percentage points, respectively. The attributes of *Effectiveness*, *Communication*, and *PME* are marginally significant and are associated with small increases in the likelihood of promotion of 2.99, 2.76, and 2.28 percentage points, respectively. This could indicate that the calculation of the relative value score for a particular FITREP may be more heavily weighted by these attributes for a given FY board.

b. Model 5 – Attribute Scores

The specification of Model (5) of Table 28 includes additional career performance variables, training variables, and experience variables. The inclusion of the other variables in Model (5) changes the effects and significance of some of the attribute score

coefficients. Now, only six variables are significant, and *PME* is insignificant. The effect of *Mission Performance* does not change, whereas the effect of *Setting the Example* falls in size slightly. *Leading Subordinates* increases the promotion probability by 4.88 points.

The inclusion of three additional career performance variables -- Commendatory FITREPs, Adverse FITREPs, and Awards -- may be responsible for causing the changes in the attribute variables, which may have been capturing the indirect effects of these factors in Table 26. An increase in the number of Commendatory FITREPS is associated with increasing the promotion probability by 1.81 percentage points, while an Adverse FITREP still has a large negative effect.

c. Model 6 – Attribute Scores

In Model (6) of Table 27, education and demographic variables are added to the model. Six of 13 attributes are statistically significant. However, there are changes to those variables due to the inclusion of the education and demographic variables. Increasing the *Mission Performance* score by one-standard deviation is associated with a 13.7 percentage point increase in the promotion probability. The coefficient for *Setting the Example* increased from the previous model to an effect of 8.45 points. The continued significance of these two variables may indicate the emphasis the Marine Corps places on these two attributes. Increases in *Mission Proficiency*, *Leading Subordinates*, and *Communication* also increase promotion by 4.68, 4.93, and 3.61 percentage points respectively. The consistency of these variables across the three models may be indicative of how reporting seniors prioritize the attributes when evaluating officers.

Much like Column (3) in Table 26, the results in Model (6) of Table 27 find that only the physical fitness variables are significant. The PFT coefficient is .05 points and is highly significant, whereas CFT is only marginally significant. Similar to Model (3) a one-point increase in the PFT score is associated with a small increase in promotion probability based on the PFT scale 0–300. The difference in significance may be due to the nature of the tests themselves i.e., how rigorous one is when compared to the other. The insignificance of the marksmanship variables may be associated with the training

emphasis on currency vice level of marksmanship. The currency of such training was not included in this study.

In Model (6) of Table 27 combat deployments continues to be the only significant career experience variable. Having one more combat deployment is associated with a 3.0 percentage point increase in the promotion rate. The absence of significant effects for combat duty could suggest that its effects are captured by the combat deployment variables. The insignificance of the joint duty variable could indicate a lack of emphasis on acquiring joint experience at this point in an officer's career.

In the education category, a master's degree is associated with a higher promotion probability by 9.0 percentage points and an increase in number of foreign languages spoken is associated with a higher likelihood of promotion by 3.9 percentage points. Both of these variables highlight the value of further education to the Marine Corps.

Table 27. Marginal Effects Estimate from Probit Models of Promotion to LtCol

	Model (4)	Model (5)	Model (6)
Performance			
Mission Performance	0.148***	0.145***	0.137***
	(0.0249)	(0.0262)	(0.0267)
Mission Proficiency	0.0428**	0.0418*	0.0468**
	(0.0212)	(0.0223)	(0.0226)
Courage	0.00785	0.00151	-0.00379
	(0.0148)	(0.0156)	(0.0160)
Effectiveness	0.0299*	0.0317*	0.0327*
	(0.0177)	(0.0184)	(0.0189)
Initiative	0.0211	0.0201	0.00399
	(0.0198)	(0.0207)	(0.0212)
Leading Subordinates	0.0395**	0.0488**	0.0493**
	(0.0194)	(0.0202)	(0.0208)
Developing Subordinates	-0.00713	-0.00470	0.00494
	(0.0187)	(0.0195)	(0.0200)
Setting the Example	0.104***	0.0764***	0.0845***
	(0.0159)	(0.0172)	(0.0179)
Ensuring Well Being of Subordinates	-0.00955	-0.0109	-0.000695
	(0.0158)	(0.0165)	(0.0171)
Communication	0.0276*	0.0523***	0.0361**
	(0.0151)	(0.0161)	(0.0172)
PME	0.0228*	0.0198	0.0184
	(0.0128)	(0.0136)	(0.0143)

	Model (4)	Model (5)	Model (6)
Decision Making	0.00267	0.00106	0.00270
	(0.0205)	(0.0213)	(0.0217)
Judgment	0.0272	0.0137	0.0159
	(0.0195)	(0.0204)	(0.0209)
Commendatory FITREP		0.0181***	0.0128**
		(0.00616)	(0.00630)
Adverse FITREP		-0.490***	-0.481***
		(0.0731)	(0.0735)
Awards		0.0170**	0.0215***
		(0.00718)	(0.00750)
Training			
Pistol Expert		0.00966	-0.000325
		(0.0399)	(0.0416)
Pistol Sharpshooter		0.0300	0.0254
		(0.0403)	(0.0419)
Rifle Expert		0.0140	0.00754
		(0.0305)	(0.0319)
Rifle Sharpshooter		0.0136	-0.00589
		(0.0355)	(0.0371)
CFT		0.000278	0.000369*
		(0.000196)	(0.000202)
PFT		0.000844***	0.000566***
		(0.000195)	(0.000203)
Experience			
Combat Duty		0.00649	-0.000543
		(0.00884)	(0.00923)
Joint Duty		0.0107	0.0114
		(0.00965)	(0.00986)
Combat Deployments		0.0244**	0.0305**
		(0.0119)	(0.0126)
Education			
Master's			0.0905***
			(0.0263)
Doctorate			0.0767
			(0.0884)
Foreign Language			0.0394**
			(0.0172)
Demographics			
GCT			-0.00185
			(0.00155)
Top-third TBS			0.0540
			(0.0426)
Mid-third TBS			0.0435
			(0.0375)
Non-White			-0.00802
			(0.0389)

	Model (4)	Model (5)	Model (6)
Female			0.113**
			(0.0490)
Married			0.0312
			(0.0459)
Dependents			0.00619
			(0.00953)
Age			-0.0290***
			(0.00605)
ROTC			0.0770
			(0.0489)
OCS			0.0973**
			(0.0460)
PLC			0.0773*
			(0.0444)
MCP			0.00177
			(0.0571)
Other Commission Source			-0.0830
			(0.104)
Observations	2,091	2,091	2,056

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Board FY variables are included in every model but not reported.

3. MOS Models

Four promotion models are estimated separately for four of the five separate MOS groups, which were defined above in Chapter IV. When the model was applied to the specialized MOS category sample, containing specialties such as lawyers and acquisition specialists, the results yielded highly implausible results. This may be due to the narrow career paths and requirements necessary for MOSs in this category. Also, the small sample size may have yielded limited variation in the explanatory variables. Because of the small sample size the FY board dummy variables were dropped so that the effect of the attribute averages could be estimated on the full sample of five boards. The models use the same specifications as in Model (6) of Table 27 above (with the exception of the omitted FY board dummies) and focus on the effects of the individual FITREP attribute scores on promotion across the four MOS groups. To allow for comparison, Model (6) from Table 27 was estimated without the FY board dummy variables and the results are in Appendix E, Model (7).

In Model (7) of Appendix E, four of 13 attribute variables are statistically significant. However, in each of the MOS-specific models, three to five of the 13 attribute scores are significant. Moreover, in each MOS category the set of significant attributes differs. Among Aviation Marines, *Mission Performance*, *Mission Proficiency*, and *Setting the Example* are all significant. Among Combat Arms Marines, significant effects are found for *Mission Performance*, *PME*, and *Judgment*. The four significant attribute coefficients for Combat Service Support MOSs are *Mission Performance*, *Leading Subordinates*, *Setting the Example*, and *Communication*. Finally, the five attributes that were significant for Aviation Ground Marines were *Mission Proficiency*, *Effectiveness*, *Developing Subordinates*, *Setting the Example*, and *PME*.

a. *Aviation*

Among attribute variables in Column (1) of Table 28 a one-standard deviation increase in the *Mission Performance* scores increases the promotion probability by 20.3 percentage points. The size of this coefficient is large and may indicate an emphasis on the highly technical performance required of aviators. The other two significant attribute effects – *Mission Proficiency* and *Setting the Example* -- are associated with an increase to promotion by 7.98 and 8.65 percentage points. Among the MOS categories Aviation is the only one to have significant variables in both “Mission” attributes, which points to the technical nature of the various missions associated with aviation MOSs.

b. *Combat Arms*

In Column (2) of Table 28, the one highly significant attribute for Combat Arms is *Mission Performance*. Increasing the *Mission Performance* score by one-standard deviation is associated with an increase in the promotion probability of 16.9 points. *PME* and *Judgment* are also significant, and the size of the coefficients indicates one-standard deviation increases in these scores increase the promotion probability by 7.11 and 10.9 percentage points, respectively. This set of variables is interesting considering that within the Combat Arms MOSs there is a greater emphasis on leadership than in other occupational fields. Described briefly in Chapter II each attribute falls into a category, leadership being one of these categories, and none of the fitness report scores in this

category are significant for this MOS. This may indicate the propensity for RSs in combat arms MOSs to capture indirect leadership effects in the *Mission Performance* or potentially the *Judgment* attributes.

c. *Combat Service Support*

From Column (3) in Table 28 Combat Service Support MOSs share two significant variables with Aviation MOSs, *Mission Performance* and *Setting the Example*. The other two significant attributes in the Combat Service Support category are *Leading Subordinates* and *Communication*. The *Setting the Example* coefficient is associated with a 8.65 percentage point increase in the promotion rate for Combat Service Support MOSs. The rest of the attributes are marginally significant at the .10 level. *Mission Performance* is associated with an increase in the promotion probability by 8.18 points; *Leading Subordinates* increases promotion rates by 6.96 percentage points; and *Communication* is increases the promotion by 5.49 points. This MOS category contains the largest number of observations (N=747) and the magnitude of the coefficients may be estimated with greater precision. This MOS group is the only one to have significant effects in the *Communication* variable, which may indicate the criticality of communication when supporting the other parts of the MAGTF.

d. *Aviation Ground*

In the fourth column of Table 28 the Aviation-ground MOS category results contain five significant attribute variables. However, the estimated coefficients are likely to be overstated and, due to the small sample size should be discounted. These results should be validated by future analysis, using a larger sample size. This category does share *Setting the Example* with other categories and *PME* with the Combat Arms category.

Table 28. Marginal Effects of Probit Promotion to LtCol within MOS Category

	Aviation	Combat Arms	Combat Service Support	Aviation-Ground
Performance	(1)	(2)	(3)	(4)
Mission Performance	0.203*** (0.0511)	0.169*** (0.0649)	0.0818* (0.0475)	0.108 (0.145)
Mission Proficiency	0.0798** (0.0402)	-0.0371 (0.0533)	0.0367 (0.0424)	0.287** (0.127)
Courage	0.0510 (0.0347)	0.0301 (0.0366)	-0.0364 (0.0273)	-0.0439 (0.0717)
Effectiveness	0.000831 (0.0389)	-0.0350 (0.0399)	0.0127 (0.0327)	0.182* (0.105)
Initiative	0.0299 (0.0391)	0.00111 (0.0488)	0.0441 (0.0391)	-0.193 (0.122)
Leading Subordinates	0.0627 (0.0410)	0.0359 (0.0493)	0.0696* (0.0366)	0.132 (0.104)
Developing Subordinates	0.0459 (0.0388)	-0.0229 (0.0428)	-0.0136 (0.0352)	-0.246** (0.107)
Setting the Example	0.0865** (0.0367)	0.0317 (0.0371)	0.0865*** (0.0317)	0.392*** (0.127)
Ensuring Well Being of Subordinates	-0.00319 (0.0323)	0.0457 (0.0405)	-0.00108 (0.0297)	-0.00390 (0.0888)
Communication	0.00605 (0.0389)	-0.0195 (0.0364)	0.0549* (0.0289)	0.104 (0.0982)
PME	-0.0516 (0.0339)	0.0711** (0.0319)	0.00946 (0.0241)	0.180** (0.0760)
Decision Making	0.0171 (0.0408)	-0.0193 (0.0480)	-0.00273 (0.0391)	0.000390 (0.114)
Judgment	-0.00750 (0.0434)	0.109** (0.0437)	0.0537 (0.0383)	0.0318 (0.100)
Commendatory FITREP	-0.0278** (0.0121)	0.0498*** (0.0159)	0.0123 (0.0109)	0.0624* (0.0364)
Adverse FITREP	-0.410*** (0.158)	-0.732*** (0.257)	-0.464*** (0.119)	
Awards	0.0351*** (0.0127)	-0.00290 (0.0190)	0.0349** (0.0160)	-0.0369 (0.0435)
Training				
Pistol Expert	0.0178 (0.0898)	-0.0840 (0.0964)	-0.0116 (0.0679)	0.209 (0.189)
Pistol Sharpshooter	0.00979 (0.0918)	-0.0837 (0.107)	0.0435 (0.0675)	0.140 (0.191)
Rifle Expert	-0.0179 (0.0618)	0.110 (0.0754)	-0.0473 (0.0556)	-0.0285 (0.140)
Rifle Sharpshooter	-0.0152 (0.0730)	-0.0195 (0.0821)	-0.0256 (0.0669)	-0.190 (0.182)
CFT	0.00131***	0.000450	4.92e-05	-0.000183

	Aviation	Combat Arms	Combat Service Support	Aviation-Ground
	(0.000486)	(0.000489)	(0.000344)	(0.000939)
PFT	-6.21e-05	0.000734	0.000966***	0.000316
	(0.000452)	(0.000493)	(0.000340)	(0.000981)
Experience				
Combat Duty	-0.00354	-0.0174	0.00541	0.0413
	(0.0195)	(0.0208)	(0.0152)	(0.0446)
Joint Duty	0.0402	-0.0109	0.0198	0.0552
	(0.0319)	(0.0212)	(0.0139)	(0.0507)
Combat Deployments	0.0467*	0.0238	0.0158	-0.0978
	(0.0261)	(0.0309)	(0.0202)	(0.0609)
Education				
Master's	0.166***	0.0494	0.0723	-0.147
	(0.0501)	(0.0557)	(0.0449)	(0.133)
Doctorate	0.0170		-0.441*	
	(0.365)		(0.252)	
Foreign Language	0.0354	0.0149	0.0563**	-0.109
	(0.0348)	(0.0385)	(0.0285)	(0.0794)
Demographics				
GCT	-0.00136	-0.00340	8.55e-05	0.00985
	(0.00314)	(0.00333)	(0.00275)	(0.00809)
Top-third TBS	0.0717	0.117	0.0314	-0.582***
	(0.101)	(0.0982)	(0.0715)	(0.178)
Mid-third TBS	0.0994	-0.0184	0.0472	-0.349**
	(0.0919)	(0.0839)	(0.0591)	(0.174)
Non-White	0.0465	0.0316	0.00729	0.0313
	(0.0901)	(0.0772)	(0.0605)	(0.191)
Female	0.289***		0.104	-0.364
	(0.0560)		(0.0727)	(0.372)
Married	-0.000458	0.365***	-0.0319	-0.0827
	(0.0903)	(0.140)	(0.0722)	(0.218)
Dependents	0.000789	0.00238	0.0164	-0.0286
	(0.0207)	(0.0208)	(0.0166)	(0.0394)
Age	-0.0619***	-0.0435***	-0.0340***	-0.0136
	(0.0150)	(0.0136)	(0.00932)	(0.0313)
ROTC	0.175***	0.00511	-0.0241	-0.184
	(0.0671)	(0.111)	(0.123)	(0.365)
OCS	0.254***	0.0781	-0.0286	-0.0136
	(0.0627)	(0.0990)	(0.110)	(0.243)
PLC	0.172**	0.109	-0.0465	-0.0719
	(0.0679)	(0.0917)	(0.113)	(0.242)
MCP	0.0678	0.0520	-0.0823	0.0714
	(0.109)	(0.111)	(0.120)	(0.286)
Other Commission Source	0.221	-0.513**	-0.245	
	(0.164)	(0.231)	(0.180)	

	Aviation	Combat Arms	Combat Service Support	Aviation-Ground
Observations	620	420	747	151

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

C. DIFFERENCES BETWEEN MOS CATEGORIES

A visual inspection of Table 28 shows the differences in the effects of attribute scores across the MOS categories. However, tests were conducted to determine whether the differences in the attributes scores across MOS categories were statistically significant. For that purpose, the Model (6) in Table 27, was modified to include dummy variables for the MOS categories and interactions of each attribute with each MOS variable. These interaction coefficients were tested against each other and the p-value results are reported in Appendix B. The p-value indicates whether the two coefficients tested are statistically different. A p-value of .05 or lower is associated with rejecting the null hypothesis that the coefficients are equal.

The tables in Appendix B find the differences in certain attribute values are significant across MOS category. As an example, Aviation and Combat Arms categories were compared and three attribute variables were statistically significantly different from each other. As Table 28 shows, that *Mission Performance* was significant for both Aviation and Combat Arms. *Mission Proficiency* and *Setting the Example* were also significant for Aviation, whereas *PME*, and *Judgment* were significant for Combat Arms. The results of the model in Appendix B show that the interaction variables for Aviation and Combat Arms are not statistically different from each other. However, *Mission Proficiency*, *PME*, and *Judgment* were significantly different from each other. This validates the estimates in Table 28 because *Mission Proficiency* for Aviation is significant but not for Combat Arms. The opposite is true for *PME* and *Judgment*.

D. COMPARISON WITH PREVIOUS STUDIES

The results in this chapter find that many of the predictors have promotion effects similar to those in prior studies. In terms of key variables, the FITREP scores exhibit

almost the same effect as in Reynold's (2011) study of LtCol promotion boards. He found that, "[the] coefficient on RV ranges from a 4.8 to 5.0 ppt [percentage points] higher promotion probability for every 1-point increase in RV above the average" (Reynolds, 2011, p.118). Prior to standardizing the FITREP scores in the models above, the RSRV, which is the same measure as the RV variable in Reynolds' study, was associated with approximately a 4.8 percentage point increase in the probability of promotion. Hoffman's (2008) model of LtCol promotion found the effects of FITREP variables were slightly higher than those in this thesis. However, Hoffman used data from a single promotion board, which may not be comparable to the larger data set used in this thesis. Regardless, FITREP scores were highly significant in predicting LtCol promotion in all three studies.

The promotion effect of the 13 FITREP attribute scores have rarely been analyzed in prior studies. An exception is Reynolds (2011), who did compare the FITREP attribute score means across different MOSs. He drew much the same conclusion as in this thesis: the mean attribute scores vary by MOS and may reflect the different MOS culture on officer evaluations.

VI. CONCLUSIONS AND RECOMMENDATIONS

The purpose of this thesis was to investigate factors that are significantly associated with the probability of promotion to LtCol. The thesis adopts the standard that an officer selected for promotion to the rank of LtCol possesses the quality characteristics desired in a Marine officer. Therefore, this thesis contributed to the broader effort of identifying the individual characteristics of Marine Corps officers that measure officer quality. This chapter interprets statistical results in terms of how they answer the thesis' three main research questions.

A. CONCLUSIONS

1. What Factors Do The Marine Corps Use to Measure and Predict Officer Quality?

The primary research question in this thesis aimed to identify the factors currently used by the Marine Corps to measure and predict selection to LtCol, adopting the standard that this level of performance captures officers of high quality. The findings show that officers selected to LtCol show high scores on FITREP attributes *Mission Performance* and *Setting the Example*. Therefore, it appears that the results achieved from assigned duties and tasks, measured by *Mission Performance*, and the bearing and manner in which officers conduct business and the perception this creates for others, as captured by *Setting the Example*, are strong predictors of high quality Marine officers.

This thesis also finds support for the relationship between officer quality and completion of advanced education, maintaining physical fitness, and participating in combat deployments. Taken together, these factors identify a potential index of officer quality: the Marine Corps seeks officers to promote to LtCol who maintain physical fitness, have combat experience, have pursued higher education, are leaders in setting the example for their subordinate marines, and successfully execute their primary missions. Narrowing down a picture of what quality is to the Marine Corps will aid in adjusting manpower processes and set the frame of mind for what board members should be judging.

One argument against this particular index of officer quality is that the definitions of these personal attributes in the PES may not be sufficiently precise and, therefore, the index should be viewed, at best, as a ‘noisy’ indicator of quality. Moreover, the FITREP attributes are interpreted through the subjective lens of the individual rater. Execution of the primary mission, for example, could potentially be interpreted differently by different raters. Similarly, there are many different ways a marine officer could set the example, which also could be subject to different interpretations by raters. On the other hand, it should be noted that the Marine Corps’ *PES manual* contains descriptions that precisely define the traits that define high-quality junior officers. The *PES manual* also provides guidance on how the MRO should be rated based on the description of each specific attribute. Thus, the guidance in the *PES manual* may be sufficient to develop a standardized criteria for evaluating officers.

2. Do the Factors Used to Measure and Predict Marine Officer Quality Vary Across MOS?

A secondary research question aimed to analyze the factors that are predictors of promotion to LtCol outcomes within individual MOS categories. The findings show that the scores on different sets of FITREP attributes predict the probability of promotion to LtCol for each MOS group. It seems safe to conclude that different MOSs value different attributes in their officers. This is to be expected, as an officer’s specialty is a narrow skill set with little crossover with other MOS groups. A logistics officer, for example, would not be expected to pilot an aircraft, just as a pilot would not be expected to lead an infantry company.

Another interesting finding is that, while there were two attributes, *Mission Performance* and *Setting the Example*, that predicted promotion to LtCol for the full sample, those two attributes are not significant in the estimates for the separate MOS categories. This can be interpreted that, regardless of MOS, all officers are considered to be, first and foremost, marines and, therefore, riflemen. If all officers are riflemen, then the same standards apply to all. However, the findings show that, although “Every marine a rifleman” is an important cultural ethos, it likely is not the basis for determining the evaluation criteria for every individual occupational specialty.

3. Are Subjective and Objective Measures Complementary in Assessing Officer Quality?

The final research question aimed to determine whether subjective and objective measures are complementary criteria in assessing officer quality. Previous research (Reynolds 2011; Hoffman 2008) has identified subjective FITREP scores as being highly significant in predicting promotion to LtCol. The results in the first three models in Table 26 identified the importance of objective factors that are not captured in the subjective summary Fitness Report scores. These objective factors include physical fitness scores, completion of advanced education, and combat experience. These factors, coupled with the FITREP scores or attribute scores, are the strongest predictors of selection to LtCol in the period covered by the data in this thesis. Other factors that predict promotion include number of awards and receiving an Adverse FITREP. The results suggest that subjective and objective measures do complement each other when investigating officer quality. Bowman and Mehay (2002) state:

A potential criticism of the above performance indicators is that they are based on subjective evaluations rather than objective output measures. However, in service organizations subjective measures have distinct advantages in analyzing work performance. Furthermore, in organizations that rely heavily on team production, no single objective measure can capture all the dimensions of an individual's work performance. In these settings intangible skills such as interpersonal communication, co-operation, dependability, and team leadership can be assessed only via supervisor appraisals. (p.704)

The utilization of both types of measures appear to be important in personnel evaluation. Baker, Gibbons, and Murphy (1994) points out: "Even if such subjective assessments of an employee's contribution to firm value are imperfect, they may complement or improve on the available objective measures" (p.1127). Consistent with Baker, et al. and Bowman and Mehay, the results in this study indicate that both subjective and objective measures provide complementary information that can be used to identify quality officers. Additionally, having objective measures of performance allows the raters to focus on intangible characteristics, such as those found in the FITREP attribute scores, which, in turn, allows for a more comprehensive evaluation of candidates for promotion.

B. QUALIFICATIONS AND LIMITATIONS

The analysis in this thesis is subject to some limitations inherent in the study of quality officers. Quality is a nebulous term that has different meanings to different people or organizations and statistical analyses of quality may not capture the whole picture. Also, the methods used to identify key variables in predicting promotion are subject to some limitations. The dataset contained 2,091 observations of eligible In-Zone officers reviewed by LtCol promotion boards during the period FY2013-FY2017. Due to the short period covered by the data, the number of observations available for individual MOS categories is somewhat limited. Additionally, the information assembled in the dataset may not capture information on all of the officer performance, career, or background factors that potentially could be important in predicting LtCol promotion.

Additionally, measures that predict promotion to LtCol are, in reality, predicting those who are deemed capable of performing the duties associated with that rank, not necessarily overall officer quality. However, this thesis adopted the approach that officers who achieve the rank of LtCol, a rank where there is no margin of error in accountability, have the desired characteristics of a high quality Marine Corps officer. A longitudinal study of newly commissioned officers, observed over their careers, might provide more insight and validation into whether the Marine Corps is selecting the “best of the best” or just the “best of the rest,” i.e., are officers that exhibit “quality” characteristics being retained through to LtCol promotion.

C. RECOMMENDATIONS

Based on the previous section’s findings, this section formulates some policy recommendations. The recommendations are intended to serve as the basis for further discussion about future directions for improving Marine Corps talent management initiatives. The topic of “quality” is broad and requires extensive research, which must be coordinated to provide comprehensive answers. This thesis intends to provide a “road map” for future research. Some recommendations support or expand on previous research recommendations.

1. Officer Promotion Process

The data analysis in this thesis found important differences in which FITREP attributes are important within each MOS category. Essentially, the Marine Corps has been promoting the “best and most qualified” officers from the general pool of officers. In fact, officers with combat service support MOSs maintain lower average fitness report scores than officers in combat arms even though these groups are compared to each other. This process can create Type I and Type II errors at the margins because there is no normalizing metric to equate the relative values across MOSs. The Marine Corps appears to be comparing apples and oranges when looking at fitness report scores.

One possible change would be to hold separate promotion boards for each MOS category. This is possible because the Marine Corps is subject to restrictions on how many officers it can promote at each rank each year and this promotion quota can be forecasted and planned by MOS group. The process for selecting the “most qualified” individuals could be improved by including the measures of quality that appear to be most highly valued within each specific MOS. Another change to consider is to have each board led by an MOS subject matter expert to guide those not intimately familiar with MOS-specific quality measures.

An argument against changing the promotion process is that by the time an officer is selected to serve on a promotion board, he or she has accumulated the experience necessary to identify high quality officers without needing to consider the different sub-cultures across MOSs. There is no doubt that the highest quality officers will stand out among the candidates. However, at the margins there may be room for error or misjudgment when comparing officer with similar characteristics. That is where the Marine Corps promotion process is most susceptible to Type I or Type II errors. These errors consist of “False positives” and “False Negatives.” False positives occur when a board selects a candidate who may be unqualified for promotion, or not actually have the desired “quality” characteristics. False negatives occur when a candidate is treated as unqualified and is not selected, when in fact he or she has the desired characteristics for promotion.

Vasquez and Williams (2002) describes the benefits of promoting by MOS: “The benefit of a promotion by MOS system is that it would be easier to compare fitness report evaluations and separate the top performing officers from the average performing officers” (p.93). However, the authors also provide arguments against adopting such a system: “The cost to the Marine Corps in applying a promotion by MOS system would be the perception that the Marine Corps values skill development over leadership development” (Vasquez & Williams, 2002, p.93). Contrary to this statement, this thesis finds that leadership development appears valued in several MOS categories.

In order for this proposed change to be successful, it will be necessary to conduct studies to determine if a board would select the same personnel for promotion in an unrestricted officer promotion process and in a process that promotes by MOS-category. One approach would be to survey small test panels of senior officers. The results from the tests panels could reveal little differences between the unrestricted promotion model and a MOS restricted model. However, the evidence may suggest the new system would produce different results and that more of the highest quality officers in each MOS category would be selected. The increase in quality within MOS would increase the overall force quality.

It is necessary to note the difference between the promotion system proposed here versus that proposed by Vasquez and Williams (2002). Their study focused on promotion by narrow MOS, whereas this study proposes promotion by broader MOS category. The method proposed in this thesis has the potential to alleviate concerns of unfair advantages for undermanned lower-level MOSs versus healthy MOSs. In particular, promoting by lower-level MOS potentially risks higher promotion rates in undermanned MOSs, which might result in lower-quality officers promoted in the undermanned MOS than in other MOSs. This would result in a direct Type I error. Restricting promotion categories to broad MOS groups ensures that no one specific MOS is preferred over others while still allowing for accurate comparisons within MOS sub-cultures. For example, promoting within combat arms MOSs, such as infantry and artillery, that may share similar sub-cultures, would prevent missing a high-quality combat service support officer just because that category’s performance averages may be lower. At the same time, it does

not single out a specific MOS for promotion allowing for the same standards to be applied without being affected by the need to fill quotas.

2. Disseminate Information on Quality

It is essential to conduct further studies on what the Marine Corps is seeking in terms of officer quality characteristics and to disseminate the results of such studies to the FMF. All officers can attest to receiving some misinformation of what the Marine Corps is looking for when promoting officers. With extensive statistical evidence on what factors are actually important, the Marine Corps can increase officer quality by telling the officers in the fleet in advance what factors matter at each promotion point. This information would tend to increase quality in two ways. First, by informing Marines about what characteristics or factors are most important, officers can focus on acquiring or perfecting those attributes. Second, the RSs and ROs can use this information to increase the accuracy of their evaluations. This information can be disseminated through commander's guidance, MARADMINs, or direct briefs by the MMOA roadshows.

An argument against providing specific guidance on the quality measures that are highly associated with promotion is that it would incentivize officers to concentrate on those specific actions and decisions to the detriment of others. However, the characteristic that are identified to be the most highly correlated with quality also may capture the indirect effects of other (unobserved or unmeasured) characteristics. Thus, even if an officer concentrates on improving performance on the less significant attributes this may be reflected in the measured, higher-value attributes.

Guidance provided at a given point in time will not be the end of the conversation as over time quality standards and measures may shift depending on changes in external factors that affect the Marine Corps. Developing the guidance will be an ongoing process as the Marine Corps continuously strives to improve the quality of officers.

3. Data Collection

In order to continue quantitative research on officer quality, extensive manpower data will be needed. The Marine Corps would benefit by providing ready access to

manpower and personnel data to researchers, such as students and faculty at the Naval Postgraduate School where a significant number of research projects are initiated. Data access will allow for more research questions to be investigated outside of a Master's thesis's scope. Projects can be undertaken within the classroom to explore data and help students become familiar with the handling of data as it relates to the Marine Corps. In short, creating databank access at the Naval Postgraduate School allows researchers to gather the data they need more efficiently and reduces the workload of data managers at Headquarters Marine Corps, freeing them up to work issues of shorter-term importance in managing Marine manpower.

4. Further Research

Several prior studies have already analyzed factors that predict promotion outcomes for Marine Corps officers. A meta-analysis of prior research could be undertaken to identify the most important and consistent officer characteristics in the literature (Stanley & Jarrell, 1989, p.161). Additionally, the analysis in this thesis should be applied to data on outcomes at the Major and Colonel promotion boards to determine if the findings in this thesis apply at different career stages. Several research topics are listed below that are encompassed within the broad topic of quality of Marine Corps personnel. It should be noted that in each of these research areas the sample size will be critical and the researcher should strive to gather as many observations as possible. Additionally, future studies should examine differences in officer performance across MOS as this thesis just scratched the surface and hypothesizes that the Marine Corps would benefit from a MOS category restricted or specialized promotion process.

- Analysis of factors that predict selection for Command.
- Analysis of factors that predict promotion to Colonel.
- Analysis of factors that predict promotion to Major.
- Analysis of factors that predict selection for Gunnery Sergeant.
- Analysis of factors that predict selection for Staff Sergeant.
- Further analysis of FITREP Attribute scores per their *PES Manual* categories.

- Meta-analysis of previous research studies to develop a comprehensive set of officer and enlisted quality characteristics.
- Further investigation of the officer promotion process to verify the Marine Corps is selecting the most qualified officer for progression relative to PMOS.
- In-depth analysis of the FITREP as an evaluation tool and comparison to evaluation practices in the civilian sector, to ensure the current instrument is capturing the appropriate performance measures
- Longitudinal analysis of Marine Corps officer data to identify factors that predict retention and/or promotion, among entry cohorts, to various career milestones, such as Major and LtCol.

These research topics need to be explored to validate the findings of this thesis and those of previous studies in the same research area. Improving talent management will not come from a single source or study, but, rather, will require numerous studies and discussions to identify what matters the most to the Marine Corps. This study is based on the maintained hypothesis that selection to LtCol embodies quality in a Marine Corps officer. However, this definition is one point of view and all angles need to be reviewed to achieve the best possible outcome.

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APPENDIX A. SUMMARY STATISTICS OF FITREP AND CAREER PERFORMANCE VARIABLES BY MOS CATEGORY

A. AVIATION

Variable	Obs	Mean	Std. Dev.	Min	Max
RSRV-P	628	91.961	2.694	83.65	98.56
RSRV-C	628	90.473	2.499	83.57	97.18
RORV-P	628	0.189	0.391	-1.310	1.287
RORV-C	628	0.008	0.362	-1.371	1.080
Mission Performance	628	4.508	0.294	3.591	5.366
Mission Proficiency	628	4.247	0.271	3.387	5.098
Courage	628	3.807	0.167	3.12	4.366
Effectiveness	628	3.894	0.184	3.081	4.548
Initiative	628	4.274	0.295	3.08	5.267
Leading Subordinates	628	3.957	0.198	3.295	4.506
Developing Subordinates	628	3.859	0.192	3.215	4.444
Setting the Example	628	4.055	0.235	2.973	4.778
Ensuring Well Being of Subordinates	628	3.909	0.168	3.278	4.533
Communication	628	4.006	0.206	3.283	4.750
PME	628	3.532	0.206	2.934	4.653
Decision Making	628	4.046	0.190	3.42	4.596
Judgment	628	4.038	0.186	3.392	4.717
Commendatory FITREP	628	4.746	2.231	0	12
Adverse FITREP	628	0.036	0.233	0	3
Awards	628	6.230	2.766	1	23

B. AVIATION-SELECTED

Variable	Obs	Mean	Std. Dev.	Min	Max
RSRV-P	392	93.126	2.121	86.39	98.56
RSRV-C	392	91.586	1.991	85.13	97.18
RORV-P	392	0.374	0.297	-0.391	1.287
RORV-C	392	0.174	0.283	-0.598	1.080

Variable	Obs	Mean	Std. Dev.	Min	Max
Mission Performance	392	4.632	0.240	3.863	5.366
Mission Proficiency	392	4.350	0.236	3.387	5.098
Courage	392	3.849	0.157	3.364	4.366
Effectiveness	392	3.951	0.170	3.389	4.548
Initiative	392	4.375	0.253	3.760	5.267
Leading Subordinates	392	4.019	0.175	3.465	4.506
Developing Subordinates	392	3.917	0.177	3.481	4.444
Setting the Example	392	4.128	0.203	3.315	4.778
Ensuring Well Being of Subordinates	392	3.930	0.163	3.46	4.533
Communication	392	4.058	0.190	3.291	4.750
PME	392	3.541	0.207	2.934	4.653
Decision Making	392	4.107	0.172	3.577	4.596
Judgment	392	4.093	0.165	3.53	4.717
Commendatory FITREP	392	5.053	2.261	0	12
Adverse FITREP	392	0.015	0.142	0	2
Awards	392	6.793	2.770	1	23

C. COMBAT ARMS

Variable	Obs	Mean	Std. Dev.	Min	Max
Combat Service Support Restricted					
RSRV-P	858	92.355	3.094	81.99	99.58
RSRV-C	858	90.646	2.720	81.74	98.6
RORV-P	858	0.183	0.410	-1.247	1.400
RORV-C	858	0.037	0.371	-1.379	1.056
Mission Performance	858	4.439	0.304	3.268	5.437
Mission Proficiency	858	4.165	0.264	3.050	5.063
Courage	858	3.798	0.203	2.986	4.444
Effectiveness	858	3.877	0.209	3.138	4.476
Initiative	858	4.281	0.310	3.210	5.176
Leading Subordinates	858	4.024	0.234	3.095	4.700
Developing Subordinates	858	3.861	0.210	3.036	4.440
Setting the Example	858	4.136	0.268	3.040	4.903
Ensuring Well Being of Subordinates	858	3.971	0.183	3.271	4.537
Communication	858	4.060	0.294	2.708	4.993
PME	858	3.605	0.275	2.812	4.917
Decision Making	858	4.009	0.218	3.205	4.653

Variable	Obs	Mean	Std. Dev.	Min	Max
Combat Service Support Restricted					
Judgment	858	4.026	0.221	3.136	4.664
Commendatory FITREP	858	5.202	2.379	0	15
Adverse FITREP	858	0.050	0.228	0	2
Awards	858	5.008	1.705	0	12

D. COMBAT ARMS-SELECTED

Variable	Obs	Mean	Std. Dev.	Min	Max
Selection-Restricted					
RSRV-P	297	93.829	2.092	87.47	99.22
RSRV-C	297	92.050	2.040	87.34	97.71
RORV-P	297	0.416	0.348	-0.351	1.445
RORV-C	297	0.263	0.331	-0.564	1.212
Mission Performance	297	4.587	0.236	4.044	5.344
Mission Proficiency	297	4.309	0.220	3.768	5.044
Courage	297	3.909	0.194	3.392	4.498
Effectiveness	297	4.006	0.206	3.458	4.572
Initiative	297	4.415	0.252	3.745	5.117
Leading Subordinates	297	4.192	0.205	3.602	4.794
Developing Subordinates	297	4.017	0.221	3.396	5.001
Setting the Example	297	4.249	0.258	3.348	5.067
Ensuring Well Being of Subordinates	297	4.044	0.168	3.647	4.801
Communication	297	4.046	0.244	3.388	4.648
PME	297	3.680	0.285	3.095	4.679
Decision Making	297	4.139	0.179	3.602	4.744
Judgment	297	4.128	0.184	3.619	4.625
Commendatory FITREP	297	5.515	2.050	1	13
Adverse FITREP	297	0.003	0.058	0	1
Awards	297	6.276	1.725	2	13

E. COMBAT SERVICE SUPPORT

Variable	Obs	Mean	Std. Dev.	Min	Max
Combat Service Support Restricted					
RSRV-P	858	92.355	3.094	81.99	99.58

Variable	Obs	Mean	Std. Dev.	Min	Max
RSRV-C	858	90.646	2.720	81.74	98.6
RORV-P	858	0.183	0.410	-1.247	1.400
RORV-C	858	0.037	0.371	-1.379	1.056
Mission Performance	858	4.439	0.304	3.268	5.437
Mission Proficiency	858	4.165	0.264	3.050	5.063
Courage	858	3.798	0.203	2.986	4.444
Effectiveness	858	3.877	0.209	3.138	4.476
Initiative	858	4.281	0.310	3.210	5.176
Leading Subordinates	858	4.024	0.234	3.095	4.700
Developing Subordinates	858	3.861	0.210	3.036	4.440
Setting the Example	858	4.136	0.268	3.040	4.903
Ensuring Well Being of Subordinates	858	3.971	0.183	3.271	4.537
Communication	858	4.060	0.294	2.708	4.993
PME	858	3.605	0.275	2.812	4.917
Decision Making	858	4.009	0.218	3.205	4.653
Judgment	858	4.026	0.221	3.136	4.664
Commendatory FITREP	858	5.202	2.379	0	15
Adverse FITREP	858	0.050	0.228	0	2
Awards	858	5.008	1.705	0	12

F. COMBAT SERVICE SUPPORT-SELECTED

Variable	Obs	Mean	Std. Dev.	Min	Max
Selection-Restricted					
RSRV-P	541	93.577	2.437	87.02	99.58
RSRV-C	541	91.721	2.201	86.27	98.6
RORV-P	541	0.339	0.327	-0.573	1.400
RORV-C	541	0.182	0.298	-0.755	1.056
Mission Performance	541	4.556	0.242	3.852	5.437
Mission Proficiency	541	4.252	0.219	3.725	4.956
Courage	541	3.838	0.194	3.298	4.444
Effectiveness	541	3.939	0.187	3.295	4.476
Initiative	541	4.390	0.256	3.654	5.176
Leading Subordinates	541	4.097	0.205	3.514	4.668
Developing Subordinates	541	3.919	0.185	3.418	4.440
Setting the Example	541	4.221	0.234	3.401	4.903

Variable	Obs	Mean	Std. Dev.	Min	Max
Ensuring Well Being of Subordinates	541	4.008	0.171	3.578	4.537
Communication	541	4.146	0.256	3.477	4.993
PME	541	3.633	0.267	3	4.785
Decision Making	541	4.081	0.183	3.516	4.653
Judgment	541	4.101	0.182	3.559	4.664
Commendatory FITREP	541	5.646	2.360	1	15
Adverse FITREP	541	0.009	0.095	0	1
Awards	541	5.384	1.555	1	12

G. AVIATION-GROUND

Variable	Obs	Mean	Std. Dev.	Min	Max
Aviation Ground Restricted					
RSRV-P	155	92.568	2.696	84.95	98.52
RSRV-C	155	90.609	2.511	84.95	96.36
RORV-P	155	0.167	0.393	-0.797	1.300
RORV-C	155	0.020	0.343	-0.776	0.919
Mission Performance	155	4.453	0.294	3.717	5.241
Mission Proficiency	155	4.152	0.268	3.496	4.937
Courage	155	3.773	0.198	3.15	4.381
Effectiveness	155	3.864	0.204	3.333	4.396
Initiative	155	4.301	0.310	3.5	5.283
Leading Subordinates	155	4.042	0.224	3.408	4.538
Developing Subordinates	155	3.888	0.222	3.354	4.609
Setting the Example	155	4.120	0.250	3.357	4.747
Ensuring Well Being of Subordinates	155	3.986	0.172	3.470	4.466
Communication	155	4.028	0.246	3.335	4.700
PME	155	3.587	0.274	2.959	4.573
Decision Making	155	4.018	0.195	3.394	4.604
Judgment	155	4.017	0.201	3.394	4.744
Commendatory FITREP	155	5.322	2.230	1	13
Adverse FITREP	155	0.064	0.315	0	2
Awards	155	4.935	1.585	1	11

H. AVIATION-GROUND-SELECTED

Variable	Obs	Mean	Std. Dev.	Min	Max
Selection-Restricted					
RSRV-P	90	93.880	2.177	88.59	98.52
RSRV-C	90	91.787	2.177	87.27	96.36
RORV-P	90	0.348	0.326	-0.403	1.300
RORV-C	90	0.182	0.286	-0.627	0.919
Mission Performance	90	4.571	0.259	3.849	5.241
Mission Proficiency	90	4.259	0.245	3.496	4.908
Courage	90	3.816	0.215	3.15	4.381
Effectiveness	90	3.932	0.195	3.480	4.396
Initiative	90	4.406	0.298	3.5	5.283
Leading Subordinates	90	4.115	0.218	3.620	4.538
Developing Subordinates	90	3.949	0.211	3.533	4.609
Setting the Example	90	4.213	0.212	3.685	4.747
Ensuring Well Being of Subordinates	90	4.022	0.173	3.676	4.466
Communication	90	4.106	0.207	3.673	4.700
PME	90	3.628	0.259	2.959	4.573
Decision Making	90	4.086	0.175	3.7	4.575
Judgment	90	4.088	0.186	3.639	4.744
Commendatory FITREP	90	5.833	2.294	2	13
Adverse FITREP	90	0	0	0	0
Awards	90	5.122	1.563	3	11

APPENDIX B. PAIRWISE COMPARISON OF FITREP ATTRIBUTES BY MOS CATEGORY

The following tables report the p-values from *t*-tests of the interactions between each FITREP attribute and each MOS category. The results in each column are p-values for differences in a given attribute between two MOS categories (listed in the column headings). The p-values test the null hypothesis of no difference between the effects. Lower p-values indicate a rejection of the null hypothesis or the hypothesis that the two interaction values are statistically the same; thus if the p-value is below a certain significance level (.10) it can be said that the two values are statistically different for that MOS category. Blue highlight is for p-values that are significant at the .10 level, green for the .05 level, and yellow for the highest .01 level.

Attributes Only p-values between MOS groups						
Test Comparisons	Aviation vs. Combat Arms	Aviation vs. Combat Service Support	Aviation vs. Aviation- Ground	Combat Arms vs. Combat Service Support	Combat Arms vs. Aviation- Ground	Combat Service Support vs. Aviation- Ground
Mission Performance	0.661	0.703	0.747	0.441	0.548	0.925
Mission Proficiency	0.104	0.104	0.366	0.751	0.065	0.076
Courage	0.348	0.041	0.510	0.378	0.983	0.528
Effectiveness	0.283	0.828	0.702	0.349	0.272	0.597
Initiative	0.674	0.411	0.0875	0.282	0.188	0.031
Leading	0.534	0.858	0.885	0.426	0.593	0.963
Developing Subordinates	0.478	0.318	0.068	0.849	0.185	0.208
Setting the Example	0.856	0.943	0.127	0.901	0.165	0.128
Well Being of Subordinates	0.160	0.585	0.757	0.328	0.552	0.995
Communication	0.309	0.334	0.357	0.032	0.098	0.729
PME	0.002	0.254	0.019	0.021	0.870	0.084
Decision Making	0.551	0.323	0.590	0.809	0.878	0.992
Judgment	0.019	0.143	0.418	0.298	0.482	0.955

Yellow: *** p<0.01

Green: ** p<0.05

Blue: * p<0.1

Full Model p-values between MOS groups						
Test Comparisons	Aviation vs. Combat Arms	Aviation vs. Combat Service Support	Aviation vs. Aviation- Ground	Combat Arms vs. Combat Service Support	Combat Arms vs. Aviation- Ground	Combat Service Support vs. Aviation- Ground
Mission Performance	0.885	0.222	0.984	0.374	0.937	0.474
Mission Proficiency	0.058	0.160	0.868	0.451	0.182	0.356
Courage	0.474	0.054	0.329	0.301	0.654	0.819
Effectiveness	0.277	0.810	0.443	0.177	0.141	0.524
Initiative	0.851	0.405	0.046	0.391	0.084	0.014
Leading	0.721	0.951	0.827	0.675	0.665	0.852
Developing Subordinates	0.703	0.572	0.228	0.896	0.350	0.374
Setting the Example	0.789	0.797	0.182	0.596	0.139	0.224
Well Being of Subordinates	0.128	0.674	0.843	0.228	0.439	0.971
Communication	0.702	0.411	0.420	0.209	0.280	0.749
PME	0.010	0.257	0.015	0.074	0.570	0.069
Decision Making	0.601	0.424	0.707	0.874	0.966	0.956
Judgment	0.012	0.105	0.497	0.283	0.350	0.781

Yellow: *** p<0.01

Green: ** p<0.05

Blue: * p<0.1

APPENDIX C. FITNESS REPORT EXAMPLE

USMC FITNESS REPORT (1610) NAVMC 10836 (Rev. 7-11) (EF) PREVIOUS EDITIONS WILL NOT BE USED FOUO - Privacy sensitive when filled in.								COMMANDANT'S GUIDANCE		DO NOT STAPLE THIS FORM	
<p>The completed fitness report is the most important information component in manpower management. It is the primary means of evaluating a Marine's performance and is the Commandant's primary tool for the selection of personnel for promotion, augmentation, resident schooling, command, and duty assignments. Therefore, the completion of this report is one of an officer's most critical responsibilities. Inherent in this duty is the commitment of each Reporting Senior and Reviewing Officer to ensure the integrity of the system by giving close attention to accurate marking and timely reporting. Every officer serves a role in the scrupulous maintenance of this evaluation system, ultimately important to both the individual and the Marine Corps. Inflationary markings only serve to dilute the actual value of each report. Reviewing Officers will not concur with inflated reports.</p>											
A. ADMINISTRATIVE INFORMATION											
1. Marine Reported On: <div style="display: flex; justify-content: space-between;"> a. Last Name b. First Name c. MI d. SSN e. Grade f. DOR g. PMOS h. BILMOS </div>											
2. Organization: <div style="display: flex; justify-content: space-between;"> a. MCC b. RUC c. Unit Description </div>											
3. Occasion and Period Covered: <div style="display: flex; justify-content: space-between;"> a. OCC b. From To c. Type </div>											
4. Duty Assignment (descriptive title): <div style="display: flex; justify-content: space-between;"> a. OCC b. From To c. Type </div>											
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> 5. Special Case: a. Adverse <input type="checkbox"/> b. Not Observed <input type="checkbox"/> c. Extended <input type="checkbox"/> </div> <div style="width: 30%;"> 6. Marine Subject Of: a. Commendatory Material <input type="checkbox"/> b. Derogatory Material <input type="checkbox"/> c. Disciplinary Action <input type="checkbox"/> </div> <div style="width: 30%;"> 7. Recommended For Promotion: a. Yes <input type="checkbox"/> b. No <input type="checkbox"/> c. N/A <input type="checkbox"/> </div> </div>											
8. Special Information: <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> a. QUAL <input type="checkbox"/> d. HT(In.) <input type="checkbox"/> g. Reserve Component <input type="checkbox"/> b. PFT <input type="checkbox"/> e. WT <input type="checkbox"/> h. Status <input type="checkbox"/> c. CFT <input type="checkbox"/> f. Body Fat <input type="checkbox"/> i. Future Use <input type="checkbox"/> </div> <div style="width: 50%;"> 9. Duty Preference: a. Code b. Descriptive Title 1st <input type="checkbox"/> <input type="checkbox"/> 2nd <input type="checkbox"/> <input type="checkbox"/> 3rd <input type="checkbox"/> <input type="checkbox"/> </div> </div>											
10. Reporting Senior: <div style="display: flex; justify-content: space-between;"> a. Last Name b. Init c. Service d. SSN e. Grade f. Duty Assignment </div>											
11. Reviewing Officer: <div style="display: flex; justify-content: space-between;"> a. Last Name b. Init c. Service d. SSN e. Grade f. Duty Assignment </div>											
B. BILLET DESCRIPTION											
C. BILLET ACCOMPLISHMENTS											

1. Marine Reported On:				2. Occasion and Period Covered:			
a. Last Name		b. First Name		c. MI	d. SSN	a. OCC	b. From To
D. MISSION ACCOMPLISHMENT							
1. PERFORMANCE. Results achieved during the reporting period. How well those duties inherent to a Marine's billet, plus all additional duties, formally and informally assigned, were carried out. Reflects a Marine's aptitude, competence, and commitment to the unit's success above personal reward. Indicators are time and resource management, task prioritization, and tenacity to achieve positive ends consistently.							
ADV	Meets requirements of billet and additional duties. Aptitude, commitment, and competence meet expectations. Results maintain status quo.	Consistently produces quality results while measurably improving unit performance. Habitually makes effective use of time and resources; improves billet procedures and products. Positive impact extends beyond billet expectations.	Results far surpass expectations. Recognizes and exploits new resources; creates opportunities. Emulated; sought after as an expert with influence beyond unit. Impact significant; innovative approaches to problems produce significant gains in quality and efficiency.				N/O
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. PROFICIENCY. Demonstrates technical knowledge and practical skill in the execution of the Marine's overall duties. Combines training, education and experience. Translates skills into actions which contribute to accomplishing tasks and missions. Imparts knowledge to others. Grade dependent.							
ADV	Competent. Possesses the requisite range of skills and knowledge commensurate with grade and experience. Understands and articulates basic functions related to mission accomplishment.	Demonstrates mastery of all required skills. Expertise, education and experience consistently enhance mission accomplishment. Innovative troubleshooter and problem solver. Effectively imparts skills to subordinates.	True expert in field. Knowledge and skills impact far beyond those of peers. Translates broad-based education and experience into forward thinking, innovative actions. Makes immeasurable impact on mission accomplishment. Peerless teacher, selflessly imparts expertise to subordinates, peers, and seniors.				N/O
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
JUSTIFICATION:							
E. INDIVIDUAL CHARACTER							
1. COURAGE. Moral or physical strength to overcome danger, fear, difficulty or anxiety. Personal acceptance of responsibility and accountability, placing conscience over competing interests regardless of consequences. Conscious, overriding decision to risk bodily harm or death to accomplish the mission or save others. The will to persevere despite uncertainty.							
ADV	Demonstrates inner strength and acceptance of responsibility commensurate with scope of duties and experience. Willing to face moral or physical challenges in pursuit of mission accomplishment.	Guided by conscience in all actions. Proven ability to overcome danger, fear, difficulty or anxiety. Exhibits bravery in the face of adversity and uncertainty. Not deterred by morally difficult situations or hazardous responsibilities.	Uncommon bravery and capacity to overcome obstacles and inspire others in the face of moral dilemma or life-threatening danger. Demonstrated under the most adverse conditions. Selfless. Always places conscience over competing interests regardless of physical or personal consequences.				N/O
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. EFFECTIVENESS UNDER STRESS. Thinking, functioning and leading effectively under conditions of physical and/or mental pressure. Maintaining composure appropriate for the situation, while displaying steady purpose of action, enabling one to inspire others while continuing to lead under adverse conditions. Physical and emotional strength, resilience and endurance are elements.							
ADV	Exhibits discipline and stability under pressure. Judgment and effective problem-solving skills are evident.	Consistently demonstrates maturity, mental agility and willpower during periods of adversity. Provides order to chaos through the application of intuition, problem-solving skills, and leadership. Composure reassures others.	Demonstrates seldom-matched presence of mind under the most demanding circumstances. Stabilizes any situation through the resolute and timely application of direction, focus and personal presence.				N/O
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. INITIATIVE. Action in the absence of specific direction. Seeing what needs to be done and acting without prompting. The instinct to begin a task and follow through energetically on one's own accord. Being creative, proactive and decisive. Transforming opportunity into action.							
ADV	Demonstrates willingness to take action in the absence of specific direction. Acts commensurate with grade, training and experience.	Self-motivated and action-oriented. Foresight and energy consistently transform opportunity into action. Develops and pursues creative, innovative solutions. Acts without prompting. Self-starter.	Highly motivated and proactive. Displays exceptional awareness of surroundings and environment. Uncanny ability to anticipate mission requirements and quickly formulate original, far-reaching solutions. Always takes decisive, effective action.				N/O
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
JUSTIFICATION:							
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1. Marine Reported On:				2. Occasion and Period Covered:			
a. Last Name		b. First Name		c. MI	d. SSN	a. OCC	b. From To

F. LEADERSHIP							
1. LEADING SUBORDINATES. The inseparable relationship between leader and led. The application of leadership principles to provide direction and motivate subordinates. Using authority, persuasion and personality to influence subordinates to accomplish assigned tasks. Sustaining motivation and morale while maximizing subordinates' performance.							
ADV	Engaged; provides instructions and directs execution. Seeks to accomplish mission in ways that sustain motivation and morale. Actions contribute to unit effectiveness.	Achieves a highly effective balance between direction and delegation. Effectively tasks subordinates and clearly delineates standards expected. Enhances performance through constructive supervision. Fosters motivation and enhances morale. Builds and sustains teams that successfully meet mission requirements. Encourages initiative and candor among subordinates.	Promotes creativity and energy among subordinates by striking the ideal balance of direction and delegation. Achieves highest levels of performance from subordinates by encouraging individual initiative. Engenders willing subordination, loyalty, and trust that allow subordinates to overcome their perceived limitations. Personal leadership fosters highest levels of motivation and morale, ensuring mission accomplishment even in the most difficult circumstances.			N/O	
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. DEVELOPING SUBORDINATES. Commitment to train, educate, and challenge all Marines regardless of race, religion, ethnic background, or gender. Mentorship. Cultivating professional and personal development of subordinates. Developing team players and esprit de corps. Ability to combine teaching and coaching. Creating an atmosphere tolerant of mistakes in the course of learning.							
ADV	Maintains an environment that allows personal and professional development. Ensures subordinates participate in all mandated development programs.	Develops and institutes innovative programs, to include PME, that emphasize personal and professional development of subordinates. Challenges subordinates to exceed their perceived potential thereby enhancing unit morale and effectiveness. Creates an environment where all Marines are confident to learn through trial and error. As a mentor, prepares subordinates for increased responsibilities and duties.	Widely recognized and emulated as a teacher, coach and leader. Any Marine would desire to serve with this Marine because they know they will grow personally and professionally. Subordinate and unit performance far surpassed expected results due to MRO's mentorship and team building talents. Attitude toward subordinate development is infectious, extending beyond the unit.			N/O	
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. SETTING THE EXAMPLE. The most visible facet of leadership: how well a Marine serves as a role model for all others. Personal action demonstrates the highest standards of conduct, ethical behavior, fitness, and appearance. Bearing, demeanor, and self-discipline are elements.							
ADV	Maintains Marine Corps standards for appearance, weight, and uniform wear. Sustains required level of physical fitness. Adheres to the tenets of the Marine Corps core values.	Personal conduct on and off duty reflects highest Marine Corps standards of integrity, bearing and appearance. Character is exceptional. Actively seeks self-improvement in wide-ranging areas. Dedication to duty and professional example encourage others' self-improvement efforts.	Model Marine, frequently emulated. Exemplary conduct, behavior, and actions are tone-setting. An inspiration to subordinates, peers, and seniors. Remarkable dedication to improving self and others.			N/O	
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. ENSURING WELL-BEING OF SUBORDINATES. Genuine interest in the well-being of Marines. Efforts enhance subordinates' ability to concentrate/focus on unit mission accomplishment. Concern for family readiness is inherent. The importance placed on welfare of subordinates is based on the belief that Marines take care of their own.							
ADV	Deals confidently with issues pertinent to subordinate welfare and recognizes suitable courses of action that support subordinates' well-being. Applies available resources, allowing subordinates to effectively concentrate on the mission.	Instills and/or reinforces a sense of responsibility among junior Marines for themselves and their subordinates. Actively fosters the development of and uses support systems for subordinates which improve their ability to contribute to unit mission accomplishment. Efforts to enhance subordinate welfare improve the unit's ability to accomplish its mission.	Noticeably enhances subordinates well-being, resulting in a measurable increase in unit effectiveness. Maximizes unit and base resources to provide subordinates with the best support available. Proactive approach serves to energize unit members to "take care of their own," thereby correcting potential problems before they can hinder subordinates' effectiveness. Widely recognized for techniques and policies that produce results and build morale. Builds strong family atmosphere. Puts motto <i>Mission first, Marines always</i> , into action.			N/O	
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. COMMUNICATION SKILLS. The efficient transmission and receipt of thoughts and ideas that enable and enhance leadership. Equal importance given to listening, speaking, writing, and critical reading skills. Interactive, allowing one to perceive problems and situations, provide concise guidance, and express complex ideas in a form easily understood by everyone. Allows subordinates to ask questions, raise issues and concerns and venture opinions. Contributes to a leader's ability to motivate as well as counsel.							
ADV	Skilled in receiving and conveying information. Communicates effectively in performance of duties.	Clearly articulates thoughts and ideas, verbally and in writing. Communication in all forms is accurate, intelligent, concise, and timely. Communicates with clarity and verve, ensuring understanding of intent or purpose. Encourages and considers the contributions of others.	Highly developed facility in verbal communication. Adept in composing written documents of the highest quality. Combines presence and verbal skills which engender confidence and achieve understanding irrespective of the setting, situation, or size of the group addressed. Displays an intuitive sense of when and how to listen.			N/O	
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
JUSTIFICATION:							

1. Marine Reported On:				2. Occasion and Period Covered:			
a. Last Name		b. First Name		c. MI	d. SSN	a. OCC	b. From To
G. INTELLECT AND WISDOM							
1. PROFESSIONAL MILITARY EDUCATION (PME). Commitment to intellectual growth in ways beneficial to the Marine Corps. Increases the breadth and depth of warfighting and leadership aptitude. Resources include resident schools; professional qualifications and certification processes; nonresident and other extension courses; civilian educational institution coursework; a personal reading program that includes (but is not limited to) selections from the Commandant's Reading List; participation in discussion groups and military societies; and involvement in learning through new technologies.							
ADV	Maintains currency in required military skills and related developments. Has completed or is enrolled in appropriate level of PME for grade and level of experience. Recognizes and understands new and creative approaches to service issues. Remains abreast of contemporary concepts and issues.	PME outlook extends beyond MOS and required education. Develops and follows a comprehensive personal program which includes broadened professional reading and/or academic course work; advances new concepts and ideas.	Dedicated to life-long learning. As a result of active and continuous efforts, widely recognized as an intellectual leader in professionally related topics. Makes time for study and takes advantage of all resources and programs. Introduces new and creative approaches to services issues. Engages in a broad spectrum of forums and dialogues.				N/O
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. DECISION MAKING ABILITY. Viable and timely problem solution. Contributing elements are judgment and decisiveness. Decisions reflect the balance between an optimal solution and a satisfactory, workable solution that generates tempo. Decisions are made within the context of the commander's established intent and the goal of mission accomplishment. Anticipation, mental agility, intuition, and success are inherent.							
ADV	Makes sound decisions leading to mission accomplishment. Actively collects and evaluates information and weighs alternatives to achieve timely results. Confidently approaches problems; accepts responsibility for outcomes.	Demonstrates mental agility; effectively prioritizes and solves multiple complex problems. Analytical abilities enhanced by experience, education, and intuition. Anticipates problems and implements viable, long-term solutions. Steadfast, willing to make difficult decisions.	Widely recognized and sought after to resolve the most critical, complex problems. Seldom matched analytical and intuitive abilities; accurately foresees unexpected problems and arrives at well-timed decisions despite fog and friction. Completely confident approach to all problems. Masterfully strikes a balance between the desire for perfect knowledge and greater tempo.				N/O
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. JUDGMENT. The discretionary aspect of decision making. Draws on core values, knowledge, and personal experience to make wise choices. Comprehends the consequences of contemplated courses of action.							
ADV	Majority of judgments are measured, circumspect, relevant and correct.	Decisions are consistent and uniformly correct, tempered by consideration of their consequences. Able to identify, isolate and assess relevant factors in the decision making process. Opinions sought by others. Subordinates personal interest in favor of impartiality.	Decisions reflect exceptional insight and wisdom beyond this Marine's experience. Counsel sought by all; often an arbiter. Consistent, superior judgment inspires the confidence of seniors.				N/O
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
JUSTIFICATION:							
H. FULFILLMENT OF EVALUATION RESPONSIBILITIES							
1. EVALUATIONS. The extent to which this officer serving as a reporting official conducted, or required others to conduct, accurate, uninflated, and timely evaluations.							
ADV	Occasionally submitted untimely or administratively incorrect evaluations. As RS, submitted one or more reports that contained inflated markings. As RO, concurred with one or more reports from subordinates that were returned by HQMC for inflated marking.	Prepared uninflated evaluations which were consistently submitted on time. Evaluations accurately described performance and character. Evaluations contained no inflated markings. No reports returned by RO or HQMC for inflated marking. No subordinates' reports returned by HQMC for inflated marking. Few, if any, reports were returned by RO or HQMC for administrative errors. Section Cs were void of superlatives. Justifications were specific, verifiable, substantive, and where possible, quantifiable and supported the markings given.	No reports submitted late. No reports returned by either RO or HQMC for administrative correction or inflated markings. No subordinates' reports returned by HQMC for administrative correction or inflated markings. Returned procedurally or administratively incorrect reports to subordinates for correction. As RO nonconcurred with all inflated reports.				N/O
A	B	C	D	E	F	G	H
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
JUSTIFICATION:							

1. Marine Reported On:				2. Occasion and Period Covered:			
a. Last Name	b. First Name	c. MI	d. SSN	a. OCC	b. From	To	
I. DIRECTED AND ADDITIONAL COMMENTS							
J. CERTIFICATION							
1. I CERTIFY that to the best of my knowledge and belief all entries made hereon are true and without prejudice or partiality and that I have provided a signed copy of this report to the Marine Reported on.				<div style="border-bottom: 1px solid black; width: 150px; margin: 0 auto;"></div> (Signature of Reporting Senior)		<div style="border-bottom: 1px solid black; width: 100px; margin: 0 auto;"></div> (Date in YYYYMMDD format)	
2. I ACKNOWLEDGE the adverse nature of this report and				<div style="border-bottom: 1px solid black; width: 150px; margin: 0 auto;"></div> (Signature of Marine Reported On)		<div style="border-bottom: 1px solid black; width: 100px; margin: 0 auto;"></div> (Date in YYYYMMDD format)	
<input type="checkbox"/> I have no statement to make <input type="checkbox"/> I have attached a statement							
K. REVIEWING OFFICER COMMENTS							
1. OBSERVATION: <input type="checkbox"/> Sufficient <input type="checkbox"/> Insufficient				2. EVALUATION: <input type="checkbox"/> Concur <input type="checkbox"/> Do Not Concur			
3. COMPARATIVE ASSESSMENT: Provide a comparative assessment of potential by placing an "X" in the appropriate box. In marking the comparison, consider all Marines of this grade whose professional abilities are known to you personally.		DESCRIPTION		COMPARATIVE ASSESSMENT			
		THE EMINENTLY QUALIFIED MARINE					
		ONE OF THE FEW					
		EXCEPTIONALLY QUALIFIED MARINES					
		ONE OF THE MANY HIGHLY QUALIFIED					
		PROFESSIONALS WHO FORM THE					
		MAJORITY OF THIS GRADE					
A QUALIFIED MARINE		UNSATISFACTORY					
4. REVIEWING OFFICER COMMENTS: Amplify your comparative assessment mark; evaluate potential for continued professional development to include: promotion, command, assignment, resident PME, and retention; and put Reporting Senior marks and comments in perspective.							
5. I CERTIFY that to the best of my knowledge and belief all entries made hereon are true and without prejudice or partiality.				<div style="border-bottom: 1px solid black; width: 150px; margin: 0 auto;"></div> (Signature of Reviewing Officer)		<div style="border-bottom: 1px solid black; width: 100px; margin: 0 auto;"></div> (Date in YYYYMMDD format)	
6. I ACKNOWLEDGE the adverse nature of this report and				<div style="border-bottom: 1px solid black; width: 150px; margin: 0 auto;"></div> (Signature of Marine Reported On)		<div style="border-bottom: 1px solid black; width: 100px; margin: 0 auto;"></div> (Date in YYYYMMDD format)	
<input type="checkbox"/> I have no statement to make <input type="checkbox"/> I have attached a statement							
L. ADDENDUM PAGE							
ADDENDUM PAGE ATTACHED: <input type="checkbox"/> YES							
NAVMC 10835 (Rev. 7-11) (EF) FOR OFFICIAL USE ONLY - Privacy sensitive when filled in. PAGE 5 OF 5							

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APPENDIX D. CORRELATION COEFFICIENTS FOR FITREP AND ATTRIBUTE SCORES

A. FITREP SCORE CORRELATION COEFFICIENTS

	RSRV-P	RSRV-C	ROCV-P	ROCV-C
RSRV-P	1			
RSRV-C	0.8842	1		
ROCV-P	0.7362	0.7759	1	
ROCV-C	0.7449	0.7975	0.9625	1

B. ATTRIBUTE SCORE CORRELATION COEFFICIENTS

	Mission Performance	Mission Proficiency	Courage	Effectiveness	Initiative
Mission Performance	1.00				
Mission Proficiency	0.80	1.00			
Courage	0.43	0.40	1.00		
Effectiveness	0.59	0.58	0.56	1.00	
Initiative	0.77	0.68	0.40	0.50	1.00
Leading Subordinates	0.61	0.52	0.43	0.55	0.54
Developing Subordinates	0.61	0.58	0.44	0.53	0.58
Setting the Example	0.53	0.42	0.40	0.48	0.51
Well Being of Subordinates	0.36	0.29	0.37	0.38	0.38
Communication	0.53	0.52	0.26	0.43	0.52
PME	0.18	0.20	0.17	0.12	0.27
Decision Making	0.70	0.69	0.45	0.64	0.64
Judgment	0.67	0.63	0.42	0.61	0.57

	Leading Subordinates	Developing Subordinates	Setting the Example	Well Being of Subordinates
Leading Subordinates	1.00			
Developing Subordinates	0.69	1.00		
Setting the Example	0.57	0.52	1.00	
Well Being of Subordinates	0.60	0.57	0.41	1.00
Communication	0.35	0.39	0.36	0.24
PME	0.13	0.22	0.21	0.12
Decision Making	0.60	0.57	0.46	0.37
Judgment	0.59	0.55	0.54	0.39

	Communication	PME	Decision Making	Judgment
Communication	1.00			
PME	0.25	1.00		
Decision Making	0.52	0.15	1.00	
Judgment	0.52	0.08	0.74	1.00

APPENDIX E. RESULTS OF MODEL (6) WITHOUT FY BOARD VARIABLES

Performance	Model (7)
Mission Performance	0.130***
	(0.0264)
Mission Proficiency	0.0498**
	(0.0224)
Courage	0.000623
	(0.0159)
Effectiveness	0.0255
	(0.0187)
Initiative	0.00860
	(0.0210)
Leading Subordinates	0.0560***
	(0.0206)
Developing Subordinates	-0.00232
	(0.0198)
Setting the Example	0.0823***
	(0.0178)
Ensuring Well Being of Subordinates	0.000489
	(0.0169)
Communication	0.0275
	(0.0171)
PME	0.0109
	(0.0142)
Decision Making	0.000285
	(0.0216)
Judgment	0.0147
	(0.0208)
Commendatory FITREP	0.00973
	(0.00624)
Adverse FITREP	-0.483***
	(0.0734)
Awards	0.0225***
	(0.00749)
Training	
Pistol Expert	0.00962
	(0.0413)
Pistol Sharpshooter	0.0305
	(0.0414)
Rifle Expert	0.00824
	(0.0317)
Rifle Sharpshooter	-0.00870
	(0.0369)
CFT	0.000313

	(0.000201)
PFT	0.000562***
	(0.000203)
Experience	
Combat Duty	-0.00872
	(0.00905)
Joint Duty	0.0146
	(0.00978)
Combat Deployments	0.0239*
	(0.0124)
Education	
Masters	0.0890***
	(0.0261)
Doctorate	0.0635
	(0.0923)
Foreign Language	0.0328*
	(0.0170)
Demographics	
GCT	-0.00129
	(0.00153)
Top-third TBS	0.0233
	(0.0423)
Mid-third TBS	0.0186
	(0.0373)
Non-White	-6.95e-05
	(0.0383)
Female	0.0953*
	(0.0512)
Married	0.0265
	(0.0453)
Dependents	0.00373
	(0.00946)
Age	-0.0362***
	(0.00593)
ROTC	0.0780
	(0.0488)
OCS	0.113**
	(0.0450)
PLC	0.0904**
	(0.0438)
MCP	0.0358
	(0.0545)
Other Commission Source	-0.0501
	(0.102)
Observations	2,056

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

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